

HELMINTHOLOGICAL ABSTRACTS

incorporating

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HELMINTHOLOGICAL ABSTRACTS

INCORPORATING BIBLIOGRAPHY OF HELMINTHOLOGY

FOR THE YEAR 1958

Vol. 27, Part 3/4

180—Acta Parasitologica Polonica.

- a. WIŚNIEWSKI, W. L., 1958.—“Characterization of the parasitofauna of an eutrophic lake. (Parasitofauna of the biocoenosis of Družno Lake—part I).” 6 (1/7), 1-64. [Polish summary pp. 63-64.]
- b. JARECKA, L., 1958.—“Plankton crustaceans in the life cycle of tapeworms occurring at Družno Lake. (Parasitofauna of the biocoenosis of Družno Lake—part II).” 6 (1/7), 65-109. [Polish summary pp. 105-107.]
- c. SULGOSTOWSKA, T., 1958.—“Flukes of birds of Družno Lake. (Parasitofauna of the biocoenosis of Družno Lake—part III).” 6 (1/7), 111-142. [Polish summary pp. 141-142.]

(180a) Wiśniewski describes the parasite fauna of a eutrophic lake in relation to the water biocoenosis. Typical and less typical hosts are listed and described. The paper includes 24 tables, of which the first three are of general importance; the others list the species of vertebrate and invertebrate hosts and their parasites which characterize a eutrophic lake. The author stresses three phenomena, namely, (i) the focal occurrence of parasites and their hosts in the lake; (ii) the presence of appropriate final and intermediate hosts in the lake fauna; and (iii) the predominance of the parasite fauna of birds over that of other groups of vertebrates. Birds account in large measure, therefore, for the constitution of the parasite fauna of the lake. [This is a very detailed paper, containing a wealth of statistical and ecological information, which does not lend itself readily to abstracting.] N.J.

(180b) Jarecka reports on the planktonic crustaceans in the life-cycle of tapeworms occurring in hosts in Lake Družno. The paper includes 15 tables and 11 plates. The study of Crustacea invaded by cestode larvae was extended over three seasons, spring, summer and autumn. Planktonic crustaceans were collected in eight places. It was found that the crustacean fauna depended on the flora which accounts for the fact that the invasion percentage of plankton in certain foci (shallow bays rich in water plants) was much greater than the invasion percentage of the same species in the lake in general. Living specimens of Cladocera, Copepoda and Ostracoda were examined for cestode larvae. No larvae were found in any species of Cladocera, but numerous species of Copepoda and Ostracoda were infected. 0.43% of the Crustacea examined were found to contain parasitic larvae, most of which were cysticeroids, the remainder being trematode larvae. There was a clear correlation between the composition of species occurring in the plankton, species of definitive hosts and their species of parasites. The size of the cysticeroids depends on the living conditions and on the species of the hosts. Eight species of Gastropoda were found to contain cysticeroids and it is concluded that the Gastropoda play an important role as tapeworm intermediate hosts. Cysticeroids of *Echinocotyle druzniensis* n.sp. were found in eight cyclopoid species.

(180c) Sulgostowska reports the results of a very extensive survey of the trematodes of birds of Lake Družno. During 1950 and 1951, 285 birds belonging to ten families and 45 species were examined and of these 143 were infected with flukes of 43 trematode species and 11 families. *Diplostomum spathaceum*, *Apophallus mühlingi*, *Echinochasmus coaxatus*, *Bilharziella polonica*, *Monilifer spinulosus*, *Notocotylus attenuatus*, *Hypoderaeum conoideum*, *Cotylurus pileatus*, *Apatemon gracilis*, *Typhlocoelum cucumerinum*, *Catantropis pacifera*, *Mesorchis pseudo-echinostomum*, *Echinostoma revolutum* and *Posthodiplostomum brevicaudatum* are regarded as

180—Acta Parasitologica Polonica (cont.)

- d. RYBICKA, K., 1958.—“Tasiemce ptaków (excl. Anseriformes) jeziora Drużno. (Parazytofauna biocenozy jeziora Drużno—część IV).” **6** (1/7), 143–178. [English summary pp. 175–178.]
- e. DOBROWOLSKI, K. A., 1958.—“Pasożyty pijawek jeziora Drużno. (Parazytofauna biocenozy jeziora Drużno—część V).” **6** (1/7), 179–194. [English summary pp. 193–194.]
- f. STYCZYŃSKA, E., 1958.—“Acanthocephala of the biocoenosis of Drużno Lake. (Parasitofauna of the biocoenosis of Drużno Lake—part VI).” **6** (1/7), 195–211. [Polish summary pp. 210–211.]

the species typical of the Lake Drużno biocoenosis. *Aythya nyroca* contained the greatest number (nine) of species of fluke and was the second commonest duck; *Anas platyrhynchos*, the commonest duck, contained eight species of trematodes, *Aythya ferina* six and *Larus ridibundus* five. The occurrence of the flukes in this biocoenosis is regulated by three main factors: (i) the degree of host specificity shown by the adult and larval stages, which reflects the mutual adaptation of host and parasite; (ii) the quantity and quality of the food available to the host, which indicates the source of infection; (iii) the season at which infection of the final host occurs, which influences the number of specimens of a given species in the biocoenosis. The various degrees of specificity are discussed and the paper is illustrated by numerous tables.

S.W.

(180d) In this work, which is part of a study of the parasite fauna of the biocoenosis of Lake Drużno, 347 birds (representing 38 species and excepting Anseriformes) were examined and 264 found infected with 24 cestode species. The cestodes are listed under hosts with notes on the degree of infection. The species most characteristically found in these birds were *Ligula intestinalis*, *Hymenolepis furcifera*, *Anomotaenia microrhyncha*, *Paricterotaenia porosa*, *Cladotaenia cirsi*, *Diorchis inflata*, *D. brevis* and *D. ransomi* [a study of the three *Diorchis* spp. has already been published in *Acta parasit. polon.*, 1957, **5**, 449–479]. Supplementary morphological data are given for *P. porosa*, *H. capellae*, *Aploparaksis filum*, *A. skrjabini*, *A. crassirostris*, *A. fusus*, *Dilepis glareola*, *Paradilepis scolecina*, *Choanotaenia musculosa*, *Anomotaenia microrhyncha*, *A. rustica*, and *A. hydrochelidonis*. The last-named is a new parasite for *Chlidomias nigra*. Three scoleces of a cestode not previously found in *Porzana porzana* have remained unidentified. They are 0.13 mm. wide with four suckers of 0.05 mm. diameter and a rostellum 0.04 mm. wide and carrying 16 hooks 0.033 mm. long. G.I.P.

(180e) This work is part of the parasitological study of Lake Drużno. The leeches collected for helminthological examination from the bottom slime and the benthic vegetation, can be divided into (i) dominant species, e.g., *Helobdella stagnalis* and *Herpobdella octoculata*, (ii) additional and less frequently occurring species, e.g., *H. testacea*, *Glossiphonia complanata* and *G. heteroclita* and (iii) rare species, five in number. They were infected chiefly by metacercariae of *Apatemon gracilis* (*Tetracotyle gracilis*), *Cotylurus cornutus* (*T. typica*) and *Prohemistomulum opacum*, and less frequently by those of *Echinostoma* and *Gorgoderia*. Some nematode larvae were also present. The most highly infected were the two dominant species (harbouring 50% of the parasites found). Infection was apparently dependent upon the position occupied by the leech in the community rather than upon the physiological adaptation of parasite to host.

G.I.P.

(180f) Styczyńska gives an account of the ecology of some Acanthocephala based upon observations made at Lake Drużno, near Elbląg in northern Poland, during 1950, 1951 and 1953. Six out of the 21 species of fish examined were found to be parasitized by Acanthocephala, the following species being found: *Acanthocephalus lucii*, most commonly, and *A. anguillae*, *Neoechinorhynchus rutili* and *Corynosomum strumosum*. Three species of frogs were found to harbour *Acanthocephalus ranae* whilst two species of Acanthocephala, namely *Filicollis anatis* and *Polymorphus minutus* were found in 10 out of 17 species of birds examined. The isopod, *Asellus aquaticus*, was found to be the only intermediate host of Acanthocephala common in Lake Drużno. Information is given on seasonal variation in the degree of infection. Styczyńska found the degree of infection in the intermediate host to be low, about 1.1%, whilst that of the final host was very much higher. The sex ratio, female:male, of *Acanthocephalus lucii*, *A. ranae* and *Filicollis anatis* was found to be 1.5:1.

I.C.W.

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- g. STYCZYŃSKA, E., 1958.—“Some observations on the development and bionomics of larvae of *Filicollis anatis* Schrank. (Parasitofauna of the biocoenosis of Družno Lake—part VII).” **6** (1/7), 213–224. [Polish summary pp. 223–224.]
- h. WIŚNIEWSKI, W. L., 1958.—“The development cycle of *Posthodiplostomum brevicaudatum* (v. Nordmann, 1832) Kozicka, 1958.” **6** (8/21), 251–272. [Polish summary p. 272.]
- i. WIŚNIEWSKI, W. L., 1958.—“The development cycle of *Psilochasmus oxyuris* Creplin, 1825.” **6** (8/21), 273–287. [Polish summary p. 287.]
- j. WIŚNIEWSKI, W. L., 1958.—“The development cycle of *Bunodera luciopercae* (O. F. Müller).” **6** (8/21), 289–307. [Polish summary pp. 306–307.]
- k. BEZUBIK, B., 1958.—“*Strigea raabei* sp.n., a new trematode from wild ducks of Poland.” **6** (8/21), 309–317. [Polish summary pp. 316–317.]

(180g) Styczyńska confirms, experimentally, that *Asellus aquaticus* L. is an intermediate host of *Filicollis anatis*. Some developmental stages of *F. anatis* are described and the time taken for development to the infective stage in *A. aquaticus*, at room temperature under experimental conditions, is two months. Infective larvae of *F. anatis* fed to an abnormal final host, *Mus musculus* L., were found, upon examination two and four weeks later, to have penetrated the intestinal wall, entering the body-cavity, and to have encysted on the mesentery. Infective larvae fed to *Philomachus pugnax* were later found to remain alive in the intestine without attaining sexual maturity. Six text figures and one plate are given. I.C.W.

(180h) Wiśniewski has found *Posthodiplostomum impraeputiatum* in *Botaurus stellaris* and *Ixobrychus minutus* (new host) at lakes Družno and Northern Mamry and identifies these morphologically with the metacercariae *Posthodiplostomum brevicaudatum* found by Kozicka in the eyes and brain of various fish in these lakes; these flukes should take the name *Posthodiplostomum brevicaudatum*. In the same habitat Wiśniewski had found cercariae in *Planorbis planorbis* which, on successful infection of fish, gave rise to these metacercariae. He describes the cercaria, metacercaria and adult and comments on types of strigeid larvae. G.I.P.

(180i) The examination of various vertebrates and invertebrates in the lakes Gołdapiwo and Northern Mamry where *Psilochasmus oxyuris* is common, permitted the elucidation of its hosts and, by morphological comparison between the larvae and adult, of its life-cycle. The final host was *Anas platyrhynchos*, the first intermediary *Bithynia tentaculata*, the second intermediaries *B. tentaculata*, *Radix ovata*, *R. ampla*, *R. auricularia* (these were also confirmed experimentally) and occasionally *Spiralina vortex*. The adult, metacercaria and cercaria are described. The cercaria is one of the largest known, is gymnocephalous and has a finned tail. G.I.P.

(180j) Wiśniewski, studying the life-cycle of *Bunodera luciopercae* in Polesie in 1939 and again recently in the Masury lakes, has shown that the first intermediaries are *Sphaerium rivicola* and *S. corneum*, that the metacercariae develop experimentally in *Daphnia pulex*, *Simocephalus expinosus*, *Eurycercus lamellatus* and *Notodromas monacha* and that they occur naturally in *Mesocyclops oithonoides* in Lake Družno and in one *M. crassus* in each of the lakes Gołdapiwo and Northern Mamry. He confirmed that these larval stages belonged to *B. luciopercae* by experimental infection of *Acerina cernua*. He describes the redia, cercaria and metacercaria and also the cercaria of *Allocreadium isoporum* (*Cercaria isopora*) found in *Sphaerium corneum* and *S. rivicola*, and lists the characters of ophthalmoxiphidiocercariae. G.I.P.

(180k) *Strigea raabei* n.sp. is described and figured from the cloaca of *Querquedula querquedula* and *Nyroca nyroca* in Poland and is differentially diagnosed from 17 species of *Strigea* chiefly by the combination of the dimensions of the body, organs and eggs, the absence of an adhesive gland and the position of the vitellaria. This is the first record of a strigeid from Anseriformes. G.I.P.

180—Acta Parasitologica Polonica (cont.)

- l. WERTEJUK, M., 1958.—“Enzootic caused by *Psilotrema oligoon* (Trematoda: Psilostomatidae) in young geese.” 6 (8/21), 319–328. [Polish summary pp. 327–328.]
- m. MICHAJŁOW, W., 1958.—“Stosunki międzygatunkowe w parazytocenozach niektórych widłonogów (Copepoda). 1. Eksperymentalne koinwazje larw tasiemców *Triaenophorus lucii* (Müll.) i *Drepanidotaenia lanceolata* (Bloch).” 6 (8/21), 329–354. [English summary pp. 348–354.]
- n. DARSKI, J., 1958.—“Wpływ małych dawek fenotiazyny na jajeczkowanie *Ascaridia galli* i *Heterakis gallinae*.” 6 (8/21), 363–366. [English summary p. 366.]
- o. GUTTOWA, A., 1958.—“Dalsze badania nad wpływem temperatury na rozwój zarodków tasiemca *Triaenophorus lucii* (Müll.) w jajeczkach, oraz na inwazyjność powstałych z nich onkosfer.” 6 (8/21), 367–381. [English summary pp. 380–381.]
- p. GROSSMAN-POJMAŃSKA, T. & SANDNER, H., 1958.—“Nowe stanowisko *Codonocephalus urnigerus* (Rudolphi, 1819) (Trematoda: Strigeidae) w Polsce.” 6 (8/21), 387–391. [English summary p. 391.]

(180l) Wertejuk reports an epidemic outbreak of *Psilotrema oligoon* infection (a comparatively rare trematode) among geese aged one to three months in Nasiłów in the Puławy area of Poland. Initial weakness and diarrhoea were followed by death in 70–100% of the geese within a few days, while older geese and other domestic birds were not affected. He describes his specimens and, from an examination of literature and his own material, confirms the identity of *P. spiculigerum* and *P. oligoon* but insists on the second name as that has priority. In the diagnosis of Psilostomatidae and of *Psilotrema* the author introduces the amendment “seminal receptable present or absent”. G.I.P.

(180m) The interspecific relationship between *Triaenophorus lucii* and *Drepanidotaenia lanceolata* was studied using *Cyclops strenuus strenuus* and *C. vicinus* with simultaneous or superimposed cestode infections while cyclops infected with one species only served as controls. Both types of mixed infections were always possible, in successive ones irrespective of the order or time lag. The extensity of infection of either of the cestode species in a mixed infection and of the two infections jointly did not essentially differ from that of the controls. The two populations, when large, exert a depressive influence on growth and development of one another which is similar to, but more intense than, that observed within a crowded population of one species, and the group of normally developing larvae is thus smaller. G.I.P.

(180n) Phenothiazine in small daily doses, varying from one thousandth to one tenth of the therapeutic dose, given for 14 days to domestic fowls depressed oviposition of *Ascaridia galli* (determined by faecal examination by Stoll's method), the one hundredth dose rate decreasing the number of ova found in the faeces by 51.4% and the one tenth dose rate by 96.4%. Ovulation of *Heterakis gallinae* was not affected. G.I.P.

(180o) Guttowa has experimentally studied the influence of temperature on survival and development of *Triaenophorus lucii* ova and the ability of larvae to infect *Cyclops strenuus strenuus* (calculated from the number of larvae which had entered the cyclops after a two-hour contact and that remaining in the test culture as compared with equivalent numbers from the control culture raised at 18°C. to 20°C.). At 0°C. to 2°C. all ova died within 42 days, at 2°C. to 4°C. the number of larvae hatching was 58% to 61% and their ability to infect 66.6%, and at 5°C. to 22°C. (optimum conditions) the values were 75% to 99% and 85% to 100% respectively. The temperature at 4°C. to 5°C. is critical marking a sudden rise in hatching and ability to infect. This thermal specificity is a factor in the adaptation of *T. lucii* to conditions prevalent at the bottom of lakes during the ovulation months (February, March and April) and therefore contributes to its mass occurrence in lakes. G.I.P.

(180p) The neighbourhood of Gdańsk is recorded as a new locality for the occurrence in Poland of *Codonocephalus urnigerus* in frogs, of which 83.3% were infected, the intensity averaging as much as 400 to 500 cysts per animal with a maximum of 1,500. Other flukes found in the frogs were *Opisthioglyphe ranae*, *Prostotocus confusus*, *Pleurogenoides medians*, *Pleurogenes claviger*, *Pneumonoeces similis*, *P. variegatus*, *Gorgoderia cygnoides* and *Diplodiscus subclavatus* (also present in tadpoles). To Dollfus & Patay's (1956) data on the occurrence of *C. urnigerus* are added records by Sosnina (1952) from Tadzhikistan, by Odening (1955) from East Germany and by Sandner (1949) from near Warsaw. Grabda, in 1954–55, found *C. urnigerus* in the lake area of Mazury (data not yet published). G.I.P.

180—Acta Parasitologica Polonica (cont.)

- q. KOZICKA, J., 1958.—“Diseases of fishes of Drużno Lake. (Parasitofauna of the biocoenosis of Drużno Lake—part VII).” 6 (8/21), 393–432. [Polish summary pp. 430–431.]
- r. GRABDA, B., 1958.—“*Pleurogenes intermedius* Isaitchikoff, 1926 and *Prosotocus mirabilis* sp.n. (Trematoda, Lecithodendriidae) in Poland.” 6 (8/21), 433–445. [Polish summary p. 445.]
- s. ŚLUSARSKI, W., 1958.—“Formy ostateczne Digenea z ryb łososiowatych (Salmonidae) dorzecza Wisły i południowego Bałtyku.” 6 (22), 447–728. [English summary pp. 682–728.]

(180q) Kozicka states that despite a high percentage of infection only some of the parasites of fishes encountered in Lake Drużno were clearly pathogenic. Investigation indicated that fish fry and adult fishes constitute two pathologically different entities. To the fry, parasites that use the fishes as intermediate hosts are pathologically the most important, namely, *Neascus scardinii*, *Posthodiplostomum brevicaudatum*, and *Tetracotyle* sp.1 in the brains, with the addition of *Diplostomum spathaceum*, *D. clavatum* and *Tetracotyle* sp.2 in the eyes; while in the older fishes maculosis disease, and parasitic infections with larvae and adults of *Rhipidocotyle illense*, metacercariae of *P. cuticola*, *D. spathaceum* and *D. clavatum*, and plerocercoids of *Ligula intestinalis* are pathogenically most significant. The account includes 13 tables, with four plates and 13 text figures illustrating the pathological effects of some of the parasites.

I.L.O.

(180r) From among the 16 flukes found in frogs in the Łuże marshes in the Kampinoska Forest north-west of Warsaw, Grabda describes two species noted for their extra-intestinal localization. *Pleurogenes intermedius*, previously recorded from the small intestine of *Rana arvalis altaica*, was now present in connective tissue cysts in the lower abdominal cavity of 31.6% of *R. terrestris* and one *R. temporaria*. The flukes were relatively large and thick and less mobile. *Prosotocus mirabilis* n.sp. was present in connective tissue cysts in the stomach wall of 3.3% of *R. terrestris*. The species shows atrophy of the ventral sucker and genital atrium and indication of self-insemination. It differs considerably from known European species; in the absence of the transverse uterine loop, and in the location of the cirrus sac in front of the ventral sucker and the genital atrium in front of the testes it shows affinity with *P. indicus* and *P. infrequentum* from India. Grabda suggests that both are Asiatic species and that their occurrence is insular in character.

G.I.P.

(180s) For this extensive study of the Digenea of Salmonidae, Ślusarski has examined a large number of fish from the Vistula basin (chiefly), Bay of Gdańsk and Baltic Sea. Infection was present in 38% of *Salmo* sp., *S. salar*, *S. trutta*, *S. trutta* m. *fario*, *S. irideus* and *S. fontinalis* and in 0.4% of *Coregonus albula*, but not in *C. lavaretus* and *Osmerus eperlanus*. The most common species was *Crepidostomum metoecus* s.l., in which three different morphological and ecological forms are distinguished. In the systematic section the 19 trematodes found are described and some of the digenean groups and their diagnoses are revised. In the Opcoelidae, *Plagioporus stefanski* n.sp. is described from *S. trutta* m. *fario*, and *Plagioporus* sp. (resembling *P. serotinus*) from *Coregonus albula*. This family also contains the Sphaerostomatinae (emended), in which *Sphaerostomum salmonis* n.sp. is described from *Salmo trutta*, and the Coitocaecinae (emended), which contains *Coitocaecum* (of which *Ozakia* becomes a synonym), *Nicolli* and *Excoitocaecum* n.g. (syn. *Coitocaecum* Nicoll, 1915 sensu Wiśniewski, 1933 p.p.) in which are placed *E. wisniewskii* n.sp. from *S. salar*, *S. trutta*, *S. trutta* m. *fario* and *S. irideus*, the three new combinations *E. skrjabini*, *E. testioobliquum* and *E. proavivum* and, tentatively, *Coitocaecum* sp. Dollfus, 1938. Allocreadiidae is emended, *Acrolichanus similis* becoming *Crepidostomum simile* n.comb., while *Fasciola laureata* (Zeder, 1800) Rudolphi, 1802 nec Nordmann, 1804 becomes a synonym of *C. farionis*, *C. brumpti* and *C. faeroense* of *C. metoecus*, *Phyllodistomum bychowskii* of *P. folium*, and *P. dogieli* of *P. macrocotyle*. In *Hemiurus* (emended), *Neohemiurus* n.subg. is erected for *H. raabei* n.sp. from *S. salar*, and *H. rugosus* becomes a synonym of *H. liiheii*. New records for hosts and for Poland are made. The parasite fauna is discussed under hosts and its zoogeographical relationships are analysed. The paper is illustrated with 36 tables and 124 figures and includes a list of 281 references.

G.I.P.

181—Acta Zoologica. Budapest.

- a. ANDRÁSSY, I., 1958.—“Erd- und Süßwassernematoden aus Bulgarien.” 4 (1/2), 1-88.

(181a) Andrásy reports on the nematode fauna in 252 samples of soil, moss, detritus, etc., collected in Bulgaria by Balogh. He records 127 species belonging to 46 genera of which *Plectus cirratus* occurred in 44 samples. He erects a new family Teratocephalidae n.fam. within the Phasmidia though some of the species therein contained combine characters of Aphasmidia. *Euterocephalus* n.g., type species *E. palustris* (de Man, 1880), has paired ovaries, spiral amphids and lip papillae. *Dotylaphus* n.g., a member of the Allantonematidae, with *D. rühmi* n.g., n.sp. is the other new genus erected. 19 other new species are described and figured: *Teratocephalus tenuis* n.sp., synonym *T. terrestris* of Rühm, 1956 [for abstract see Helm. Abs., 25, No. 484a]; *T. costatus* n.sp.; *Tylenchus* (*Tylenchus*) *baloghi* n.sp.; *T. (Filenchus) valkanovi* n.sp.; *Ditylenchus melleus* n.sp.; *Gottholdsteineria quarta* n.sp.; *Nothotylenchus thornei* n.sp.; *N. exiguus* n.sp.; *Aphelenchoides speciosus* n.sp.; *Plectus inquirendus* n.sp.; *Dorylaimus meylli* n.sp.; *D. bureshi* n.sp.; *D. discolaimioideus* n.sp.; *D. allgénii* n.sp.; *D. perspicuus* n.sp.; *D. simus* n.sp.; *Tylencholaimellus marianae* n.sp.; *Triplonchium bulgaricum* n.sp.; and *Alaimus macer* n.sp. The female of *Aporcelaimus laetificans* (Andrásy, 1956) n.comb., synonym *Dorylaimus laetificans* Andrásy, 1956, and the males of *Protorhabditis tristis* (Hirschmann, 1952) Dougherty, 1955, *Plectus parietinus* Bastian, 1865, *Dorylaimus brevis* Altherr, 1952 (synonym *D. carteri* subsp. *brevis* Altherr, 1952), and ?*Alaimus acutus* Thorne, 1939 are described and figured for the first time. The new combination *Euterocephalus crassidens* (de Man, 1880) is also made. There is a key to those ten species of *Dorylaimus* which have conical tails and pre-anal supplements starting in the region of the spicules. *Plectus opisthocirculus* Andrásy, 1952 is upgraded from *P. longicaudatus* var. *opisthocirculus*.

J.B.G.

182—Acta Zoologica Sinica. Peking.

- a. BIKHOVSKI, B. E. & NAGIBINA, L. F., 1958.—[*Anchorophorus sinensis* n.g., n.sp., a representative of a new family of monogenetic trematodes.] 10 (1), 1-7. [In Chinese: also in Russian pp. 8-18.]
- b. WU, S. C., 1958.—[On the occurrence of *Cooperia* in the pancreas of Chinese cattle, with description of a new species, *Cooperia erschovi* n.sp. (Nematoda: Trichostrongylidae).] 10 (1), 19-26. [In Chinese: English summary pp. 24-25.]
- c. KOU, C. C., 1958.—[Studies on parasitic nematodes of mammals from Canton. I. Some new species from *Paradoxurus minor exitus* Schwarz, *Paguma larvata larvata* (Hamilton Smith) and *Manis pentadactyla aurita* Hodgson.] 10 (1), 60-72. [In Chinese: English summary pp. 68-71.]
- d. KOU, C. C., 1958.—[Studies on parasitic nematodes of mammals from Canton. II. Three new species of *Trichochemia* n.g.] 10 (1), 73-82. [In Chinese: English summary pp. 79-82.]
- e. LONG, S. & WAI, M. T., 1958.—[Parasitic worms from Tai Hu fishes: digenetic trematodes. I. The genus *Phyllodistomum* Braun, 1899 (Gorgoderidae), with descriptions of four new species.] 10 (4), 348-368. [In Chinese: English summary pp. 364-368.]
- f. LONG, S. & LEE, W. C., 1958.—[Parasitic worms from Tai Hu fishes: digenetic trematodes. II. Opisthorchiidae and other families, with a description of a new species of *Opisthorchis*.] 10 (4), 369-376. [In Chinese: English summary pp. 375-376.]
- g. ANON., 1958.—[On the occurrence of *Trichostrongylus* in the pancreas of Chinese ruminants (Nematoda: Trichostrongylidae).] 10 (4), 438-442. [In Chinese: English summary p. 442.]

(182a) *Anchorophorus sinensis* n.g., n.sp. is described and figured from the gills of *Cynoglossus semilaevis* from the Yellow Sea, China. These large Discocotylinea are placed in a new family Anchorophoridae on the grounds of the unusual armature on the opisthaptor: the opisthaptor has three pairs of groups of chitinous elements (corresponding to clamps) arranged along the lateral margins; distally, there are two finger-like outgrowths, each with a small clamp, and a median process bearing two pairs of hooks. The chitinous elements and the two small clamps are each armed with eight chitinous pieces. Eyes are absent and the copulatory organ carries a crown of six hooklets.

G.I.P.

(182b) The author records two species of nematodes, namely, *Cooperia laterouniformis* Chen and *C. erschovi* n.sp. from the pancreas of cattle in various parts of China. Hitherto this genus of worms has been considered as being parasitic solely in the alimentary tract. The new species is closely related to *C. pectinata*, but differs in that the spicules have curved cross striations instead of straight ones, in the shape and structure of the genital cone, in the early branching of the dorsal ray, and in the location in the pancreas. L.S.Y.

(182c) The author reports on the nematodes in his collection of helminths from various mammals in Kwangtung, South China. The present paper deals with two new genera and four new species. *Chenospirura kwangtungensis* n.g., n.sp. from the stomach of *Manis pentadactyla aurita* is placed in the Habronematinae. The new genus is closely related to *Habronema* but differs in having unlobed lips, the vulval opening in the anterior part of the body and eggs of a very different shape. *Chenofilaria filaria* n.g., n.sp. is found in the blood vessels of the liver of *M. p. aurita* and is placed in the subfamily Filariinae as defined by Skryabin and Shikhobalova. It resembles *Oswaldofilaria* closely but differs in the absence of a buccal capsule, the presence of a pair of caudal appendages, and in having the vulval opening far anterior. *Toxocara paradoxura* n.sp., from the stomach and duodenum of *Paradoxurus minor exitus*, resembles *Toxocara tanuki*, but differs in having narrow cervical alae and 19-21 pairs of pre-anal papillae. It also differs from all the other species of the genus by having a single terminal spike on the tail of both sexes. *Arthrostoma cheni* n.sp., collected from the small intestine of *P. m. exitus*, resembles *A. felineum* but differs in having a spicule at least twice as long, and in the presence of a pre-vulval flap. L.S.Y.

(182d) *Trichocheenia* n.g. with three new species, *T. cantonensis* n.sp., *T. manisa* n.sp. and *T. papillosa* n.sp., all from the small intestine of *Manis pentadactyla aurita*, belongs to the subfamily Molineinae. The new genus resembles *Shattuchius*, *Delicata* and *Molineus*, but differs sufficiently, in the bursal ray pattern and in having the vulva in the posterior fifth of the body, to erect a new genus. The three new species are not differentiated, but a key to their separation uses mainly the female tail extremity. In *T. cantonensis* the tail is rounded; in *T. papillosa* the tail has four small terminal processes, a dorsal spike and 32-34 longitudinal ridges; while in *T. manisa* there are one to four terminal processes, a terminal spike and 16 to 18 longitudinal ridges. L.S.Y.

(182e) In a survey of helminths parasitic in fresh-water fishes in Tai Hu, the authors report on the following nine species of *Phyllodistomum*, of which four are new: *P. (P.) sinipercae* n.sp., *P. (P.) anguillae* n.sp., *P. (P.) lesteri* Wu, 1938, *P. (P.) sinense* Wu, 1937, *P. (Catop-troides) bai* n.sp., *P. (C.) carassii* n.sp., *P. (C.) parasiluri* Yamaguti, 1934; *P. (C.) pawlovskii* (Zmeev, 1936) and *Phyllodistomum* sp. *P. (P.) sinipercae* was collected from the urinary bladder of *Siniperca chuatsi*. Its quadrangular posterior body resembles *P. angulata*, but the new species is distinguished by the equal suckers, the presence of cuticular spines and by the larger testes. The large testes resemble those of *P. megalorchis*, but this species has a rounded posterior body, the oral sucker smaller than the ventral sucker and no cuticular spines. *P. (P.) anguillae* was collected from the urinary bladder of *Anguilla japonica* and *S. chuatsi*. Its size, suckers and vitellaria resemble *P. pseudofolium* Nybelin, 1926, but it differs in having compactly arranged reproductive organs, a smooth ovary, deeply lobed testes and larger eggs. *P. (C.) bai* was collected from the urinary bladder of *Sphaeroides ocellatus*. It resembles *P. mogurndae* Yamaguti, 1934, but differs in its smaller size, equal suckers, deeply lobed large testes, and vitellaria lobed and unbranched. *P. (C.) carassii* was collected from the urinary bladder and ducts of *Carassius auratus*. It resembles *P. acceptum* Looss, 1901, and *P. pawlovskii*, but differs from the former in having the intestinal caeca devoid of indentations, smooth or slightly lobed testes and a relatively smaller ventral sucker. It differs from *P. pawlovskii* in having the ventral sucker larger than the oral, stout branches of vitellaria, and ovary and testes with smooth borders. It further differs from both species by the branches of the vitellaria arising from the distal end of the main stem instead of the proximal part. The adult of *P. lesteri* is described for the first time, having been found in the urinary bladder

of *Culter brevicauda* and *Anguilla japonica*. The second intermediate hosts are *Palaemon asperulus* and *Macrobrachium nipponense*. *Phyllodistomum sinense* is redescribed from the type host, *Odontobutis obscura* and *P. wiskowskyi* Pigulevski, 1953 is shown to be its synonym. *P. parasiluri* was collected from the urinary bladder of *Parasilurus asotus* and *Pseudobagrus fulvidraco*. It is reported for the first time in China and the latter host is a new host record. *Phyllodistomum pawlovskii* is redescribed from Chinese material collected from the urinary bladder of *Pseudobagrus fulvidraco*. *Phyllodistomum* sp., a single immature and unidentified specimen, was collected from the urinary bladder of *Mastacembelus aculeatus*. L.S.Y.

(182f) The second report on parasitic worms from fishes deals with one new and three known species. *Opisthorchis parasiluri* n.sp. was found in the gall-bladder of *Parasilurus asotus*. It differs from *O. pedicellata* and *O. piscicola*, the only other species parasitizing fishes, in having an oral sucker larger than the ventral, bifurcation of the intestinal caeca between the pharynx and ventral sucker, vitellaria which begin near the caecal bifurcation, and the two testes slightly diagonally placed. *Genarches goppo* (Ozaki, 1925) was found in the stomach of *Odontobutis obscura*; *Paratormopsolus siluri* Dubinina & Bikhovski, 1954 in the intestine of *Pseudobagrus fulvidraco* and *Parasilurus asotus*; and *Carassotrema koreanum* Park, 1938 in the gut of *Carassius auratus*, *Parabramis terminalis*, *Cyprinus carpio*, *Erythroculter mogolius*, *Squaliobarbus curvicaulus*, *Mylopharyngodon piceus*, *Aristichthys nobilis*, *Hypophthalmichthys molitrix*, *Ctenopharyngodon idellus* and *Hemiculter leucisculus*. L.S.Y.

(182g) *Trichostrongylus colubriiformis* and *T. probolurus* are found in the pancreas of sheep, goat and camel in various parts of China. 2% to 34% of nearly 800 animals examined were infected. L.S.Y.

183—Agricultural Review. London.

- a. POOL, W. A., 1958.—“Sheep diseases—scrapie and *Nematodirus*.” 3 (11), 42–44.
- b. JONES, F. G. W., 1958.—“Aspects of plant nematology in Great Britain.” 3 (12), 8–19.

(183a) Pool reviews pasture and flock management practices in relation to the prevention of *Nematodirus* infection in young lambs. Infected pasture should be stocked with mature sheep, which are relatively immune; young lambs should not be grazed, during the early part of the season, on pastures grazed by ewes and lambs the previous year; or young lambs may be box fed if infection on pasture is probable. J.M.W.

(183b) After commenting on the manpower engaged on research on plant-parasitic nematodes in Great Britain and on the supply of trained nematologists for posts at home and abroad, Jones briefly reviews some aspects of research. These include the biology of cyst-forming nematodes (*Heterodera* spp.), the egg-hatching factor, breeding for resistance, root-knot nematodes (*Meloidogyne* spp.), the stem and bulb eelworm (*Ditylenchus dipsaci* (Kühn)). Tables are given setting out the susceptibility of principal hosts of cyst-forming nematodes and host lists of some races of *D. dipsaci*. F.G.W.J.

184—Agriculture. London.

- a. DAVIES, S. F. M., 1958.—“Parasites in the poultry-house.” 65 (9), 445–449.

(184a) Davies reviews the common parasites of poultry and their control, dealing *inter alia* with *Ascaridia galli*, *Capillaria* spp. and *Heterakis gallinae*. J.M.W.

185—American Journal of Hygiene.

- a. CHEEVER, A. W. & WELLER, T. H., 1958.—“Observations on the growth and nutritional requirements of *Schistosoma mansoni* in vitro.” 68 (3), 322–339.

(185a) Schistosomulae of *Schistosoma mansoni* were recovered 16 to 18 days after intraperitoneal infection of mice and were cultured *in vitro* in a variety of nutrient media. Growth was measured by camera lucida tracings of individual schistosomulae. The addition of human

or horse red cells to the media stimulated growth; growth-promoting factors appeared to reside in all membranes. More rapid growth occurred in horse serum absorbed with human r.b.c. than in unmodified horse serum; the addition of 10% chick embryo extract greatly improved growth, some schistosomulae reaching 7 mm. in length from 0.4 mm. in three weeks. A defined medium (Medium 199) would support schistosomulae for 12 days; addition of serum albumin or purified globin prolonged survival time but no growth occurred. Considerable growth was produced in a medium consisting of equal parts of Medium 199 and human serum. All sera were reinforced with 100 units of crystalline penicillin G, 100 µgm. of streptomycin sulphate and 50 µgm. of phenol red per ml. While growth occurred in the media employed conditions were considered sub-optimal since full size and sexual maturity were not achieved.

O.D.S.

186—American Journal of Tropical Medicine and Hygiene.

- a. BOTERO, D. & GOMEZ, J. J., 1958.—“The first case of sparganosis in Colombia.” 7 (6), 597–599.
- b. WAGNER, E. D., LEMON, F. R. & BURNETT, H. S., 1958.—“The use of dithiazanine in the treatment of helminthiasis in Mexican farm laborers.” 7 (6), 600–602.
- c. LORD, R. A., 1958.—“Studies on the use of cortisone and ACTH in trichinosis.” 7 (6), 611–617.
- d. WALTON, B. C., WINN, M. M. & WILLIAMS, J. E., 1958.—“Development of resistance to molluscicides in *Oncomelania nosophora*.” 7 (6), 618–619.
- e. KUNTZ, R. E., LAWLESS, D. K., LANGBEHN, H. R. & MALAKATIS, G. M., 1958.—“Intestinal protozoa and helminths in the peoples of Egypt living in different type localities.” 7 (6), 630–639.
- f. FERGUSON, F. F. & PALMER, J. R., 1958.—“Biological notes on *Marisa cornuarietis*, a predator of *Australorbis glabratus*, the snail intermediate host of schistosomiasis in Puerto Rico.” 7 (6), 640–642.

(186b) Of 91 Mexican labourers with mixed helminth infections treated with dithiazanine iodide, 64 were followed up over a period of 90 days. Two dose schedules were used almost equally. Patients received 200 mg. t.i.d. for four days or 300 mg. t.i.d. for three days. 22 cases harbouring *Ascaris*, five with *Trichuris*, three with *Enterobius*, six with *Taenia* sp. and one with *Strongyloides* were cured. Of 16 hookworm infections three were cured and of 23 *Hymenolepis* infections 10 were cured. No significant changes were observed in urine or blood up to one week after treatment. Of 73 persons treated nausea was produced in 24 (32.8%) while 18 (24.7%) vomited. One case recovering from hepatitis could not tolerate the drug; one case could not tolerate the drug in doses greater than 100 mg. t.i.d. but a total of 2,400 mg. was given. The zinc sulphate concentration technique was used for all stool examinations. [This would not be expected to provide valid evidence in *Enterobius* infections.]

O.D.S.

(186c) By studies on experimentally infected white rats, Lord was able to confirm that ACTH therapy in trichinellosis minimizes the loss of weight, decreases mortality, prolongs survival time, slightly reduces eosinophilia, and leaves the tissue response unaltered. By contrast, cortisone therapy appeared to have no beneficial effect and, in large doses, was actually quite toxic. It was not possible to determine whether muscle tissue response was affected by cortisone therapy, but the evidence suggested that it enabled more larvae to penetrate the intestinal mucosa. These differences could not be explained on the basis of the experiments reported.

J.M.W.

(186d) Despite repeated applications of molluscicides in some areas in Japan it has been observed that eradication of *Oncomelania nosophora* has not been achieved. This has led Walton, Winn & Williams to investigate the possibility that resistance to chemical molluscicides may have been developed by these snails. Samples of snails from the treated areas were subjected to laboratory tests with the appropriate compounds and samples from untreated areas were used as controls. The results failed to show any resistance to sodium pentachlorophenate even in samples from areas treated regularly over a period of seven years but a marked degree of resistance to dinitro-o-cyclohexyphenol was demonstrated.

C.W.

(186e) Kuntz *et al.*, using the same technique as in their previous studies, examined 1,408 human faecal specimens collected (mainly from schoolchildren) over two years from widely separated localities in Lower and Upper Egypt. Desert, farming, urban and coastal fishing communities were represented. The following 19 species of helminths were recorded: *Ancylostoma* sp., *Ascaris lumbricoides*, *Enterobius vermicularis*, *Heterodera* sp., *Strongyloides stercoralis*, *Trichostrongylus* spp., *Trichuris trichiura*, *Diphyllbothrium* sp., *Hymenolepis diminuta*, *H. nana*, *Taenia* spp., *Dicrocoelium dendriticum*, *Fasciola* sp., *Heterophyes heterophyes*, *Haplorchis pumilio*, *H. taichui*, *Opisthorchis* sp., *Schistosoma mansoni* and *S. haematobium*. A table lists the prevalence of each of these infections in each locality and type of community. *Ascaris lumbricoides* was the commonest helminth. Hookworm was less common than might have been expected. The inhabitants of the arid areas of Sinai were the most averminous, with 87% worm-free. A study of infections in snails, examination of vertebrate hosts in Lower Egypt, and the present survey revealed an apparent "heterophyid trematode complex". J.M.W.

(186f) Ferguson & Palmer describe the ecology of *Marisa cornuarietis* in Puerto Rico. This ampullarid snail has proved to be very effective in reducing populations of *Australorbis glabratus* by its voracious eating habits. *Marisa* is able to survive everywhere that *Australorbis* exists and even in waters too heavily polluted to permit colonization by the schistosome intermediate host. C.W.

187—American Journal of Veterinary Research.

- a. WADE, A. E. & SWANSON, L. E., 1958.—"Lungworm infections in calves produced by subcutaneous injections of larvae." **19** (73), 792-793.
- b. VEGORS, H. H., SMITH, W. N., BAIRD, D. M., CIORDIA, H., BIZZELL, W. E. & SELL, O. E., 1958.—"Phenothiazine treatment of yearling beeves on winter pastures." **19** (73), 805-810.
- c. CAUTHEN, G. E. & LANDRAM, J. F., 1958.—"The effect of experimental infection with *Ostertagia ostertagi* and *Trichostrongylus axei* in calves on weight gain, feed consumption, and feed utilization." **19** (73), 811-814.
- d. HERLICH, H., PORTER, D. A. & KNIGHT, R. A., 1958.—"A study of *Haemonchus* in cattle and sheep." **19** (73), 866-872.
- e. TROMBA, F. G. & DOUVRES, F. W., 1958.—"Cross transmission of nematodes of domestic animals. I. Experimental infection of swine with *Trichostrongylus colubriformis*." **19** (73), 918-920.

(187a) The authors show that characteristic infections, similar to those obtained by oral administration, can be established by the subcutaneous injection of the larvae of *Dictyocaulus viviparus*. Larvae injected in the first larval stage produced a mild infection. The site of injection does not appear to affect the establishment of an infection by this route of injection. K.H.

(187b) Vegors *et al.* investigated the effectiveness of combined free-choice and therapeutic administration of phenothiazine on the control of gastro-intestinal nematode parasites of beef yearlings on winter pastures in Georgia and its effect on their average daily gain. The parasites in question were *Trichostrongylus axei* and *Ostertagia ostertagi*. *Haemonchus* spp. and intestinal nematodes were not found in significant numbers. They found that (i) untreated animals on temporary (oats and rye grass) forages had fewer stomach-worm larvae than similar animals on crimson clover or fescue pastures and made better weight gains; (ii) low level feeding of phenothiazine was of economic benefit only to animals grazing on fescue forage; (iii) the use of phenothiazine-mineral blocks for free-choice therapy was inferior to a loose mixture of drug and mineral on account of low daily intake; (iv) combined treatment was effective against pre-infective larval stages on pasture and against adult stomach-worms, provided that average daily intake per animal was 2 gm. or more, and therapeutic drenching was conducted at least twice during the winter-spring grazing period; and (v) type of pasture grazed was more important than phenothiazine intake in relation to numbers of stomach-worms found at necropsy. J.M.W.

(187c) Cauthen & Landram studied the effects of subclinical parasitism in nine-month-old calves caused by *Ostertagia ostertagi* and *Trichostrongylus axei*. They found that when 224,000 *O. ostertagi* larvae and 448,000 *T. axei* larvae or less were administered experimentally to animals on a good ration, there was no change in average daily weight gain, feed intake and feed utilization during an eight-week post-infection period. When one million *T. axei* larvae were administered to calves fed a reduced protein ration there was loss of weight, and reduction in average daily feed intake and feed utilization as compared with control animals on a normal diet. Clinical parasitism was apparent in one out of four infected calves on 11% digestible protein and two out of four infected calves on 7% digestible protein. J.M.W.

(187d) Herlich *et al.* report the results of an investigation of the common large stomach worm of cattle and sheep in the U.S.A.—*Haemonchus contortus*—to determine the differences between the bovine and ovine strains and to assess susceptibility to cross infection in the two groups of hosts. A study was made of 2,716 male and 2,880 female worms recovered from cattle and sheep that acquired their infection by grazing on pastures contaminated with *Haemonchus* of bovine or ovine origin, and from other animals that had been experimentally infected. Spicule length was significantly greater in male worms of the bovine strain. The vulval process was typically knob-like in female worms of the bovine strain, linguiform in those of the ovine strain. Bovine strain worms recovered from experimentally infected lambs were significantly shorter and fewer in number than those recovered from similarly experimentally infected calves, whereas the opposite was true for the ovine strain. The prepatent period of the ovine strain was shorter (18 to 22 days) than that of the bovine strain (24 to 32 days). The authors conclude that the bovine and ovine strains of *Haemonchus contortus* in the U.S.A. are comparable to the *H. placei* and *H. contortus* of Australian workers, normal parasites of cattle and sheep, respectively. J.M.W.

(187e) Tromba & Douvres found that *Trichostrongylus colubriformis* infection could be established in pigs 26 to 48 days old when infective larvae were administered *per os*, whereas pigs 78 to 116 days old were refractory to infection. Pathological changes produced were minor; and clinical data and necropsy findings differed from those reported for sheep only in degree. The infection in pigs was transitory. J.M.W.

188—American Midland Naturalist.

- a. BOGITSH, B. J., 1958.—“Observations on the seasonal occurrence of a pseudophyllidean tapeworm infecting the alimentary tract of *Lepomis macrochirus macrochirus* Raf. in Albemarle County, Virginia.” **60** (1), 97–99.

(188a) Bogitsh reports on observations on the occurrence of a species of *Bothriocephalus* infecting the alimentary tract of the fish *Lepomis macrochirus macrochirus* Raf. in Albemarle County, Virginia. The greatest incidence of infection was observed in December, January and February. Maximum size development was reached during the April–May period. By contrast, both incidence and size of parasite were minimal during June and July. The author concludes that this tapeworm, which he believes to be a new species, cannot achieve sexual maturity in this host. N.J.

189—Annales Historico-Naturales Musei Nationalis Hungarici.

- a. ANDRÁSSY, I., 1958.—“Über das System der Mononchiden (Mononchidae Chitwood, 1937; Nematoda).” *Series Nova*, **9**, 151–171.

(189a) In the Mononchidae Cobb conceived the genus *Mononchus* with six subgenera. This classification has caused some inconsistencies which have now been resolved by the raising to generic rank of these subgenera and the creation of five new genera. Andrassy gives a key to generic differentiation and of 116 described species, considers 81 as valid, 28 as synonyms or *lapsi*, two as *species inquirendae*, one as not belonging to the mononchs and four he was unable to deal with as they were in inaccessible papers. The genera, which are

separated on the arrangement of their dorsal (d) and ventral (v) teeth, are: *Mononchus* Bastian, 1865—(d) anterior (v) absent; *Iotonchus* (Cobb, 1916) n.grad.—(d) posterior (v) absent; *Cobbonchus* n.g.—(d) anterior (v) 2 posterior; *Michonchus* n.g.—(d & 2 v) at same level pointing forwards; *Anatonchus* (Cobb, 1916) n.grad.—(d & 2 v) at same level pointing backwards; the following have many ventral denticles instead of two teeth; *Mylonchulus* (Cobb, 1916) n.grad.—(d) anterior (v) several transverse rows; *Prionchulus* (Cobb, 1916) n.grad.—(d) anterior (v) two longitudinal ridges; *Sporonchulus* (Cobb, 1917) n.grad.—(d) anterior (v) four longitudinal rows or directly placed on stoma wall; *Judonchulus* n.g.—(d) posterior (v) longitudinal rows; *Granonchulus* n.g.—(d) anterior (v) one transverse row, dispersed denticles closely subventral; *Brachonchulus* n.g.—(d) anterior (v) several transverse rows, dispersed denticles rather sublateral. [In a footnote Andrassy proposes the use of the term "novus gradus" as an equivalent to the English "new rank".] J.B.G.

190—Annales de l'Institut Pasteur. Paris.

- a. DESCHIENS, R., 1958.—"Les distomatoses hépatiques humaines en France." 94 (3), 256-271. [English summary pp. 270-271.]

(190a) Deschiens points out that hepatic distomiasis is commoner in France than was formerly thought. It is usually due to *Fasciola hepatica* and only rarely to *Dicrocoelium dendriticum*. It is most prevalent south of the Loire in the Lyonnais, Dombes, central mountainous and south-western regions; but cases do occur north of the Loire, especially in Flanders, Lorraine, Franche-Comté, Normandy, Mayenne and Brittany. The distribution is illustrated by a map. After describing the symptomatology, Deschiens points out that early diagnosis is important in obtaining the best results from therapy and this can only be achieved prior to the third month by observing high eosinophilia in combination with fever, hepatic symptoms and toxæmia. The intradermal and complement fixation reactions may be used to provide confirmation. After the third month stool examination should reveal eggs in the faeces. Emetine hydrochloride in the same dosage as for amoebiasis is the best treatment. Preventive measures should include the protection of watercress beds against contamination by cattle and control of the cultivation and sale of watercress. J.M.W.

191—Annales de Parasitologie Humaine et Comparée.

- a. DOLLFUS, R. P., 1958.—"Cours d'helminthologie. I. Trématodes. Sous-classe Aspidogastrea." 33 (4), 305-395.
 b. BIGUET, J., DEBLOCK, S. & CAPRON, A., 1958.—"Contribution à la connaissance des Microphallidae Travassos, 1920 (Trematoda). II." 33 (4), 396-444.
 c. CHABAUD, A. G., 1958.—"Essai de classification des nématodes Habronematinae." 33 (4), 445-509.
 d. DEBLOCK, S., CAPRON, A. & BIGUET, J., 1958.—"Contribution à la connaissance des Microphallidae Travassos, 1920 (Trematoda) des oiseaux de France. III. Description de *Levinseniella tridigitata* nov. spec. Étude critique du genre *Levinseniella* Stiles et Hassall, 1901." 33 (5/6), 513-537.
 e. GOLVAN, Y. J., 1958.—"Le phylum des Acanthocephala. Première note. Sa place dans l'échelle zoologique." 33 (5/6), 538-602. [English summary p. 593.]

(191a) It is not possible in an abstract to do more than indicate the scope of this paper. A general account of the sub-class Aspidogastrea is followed by a table setting out the species, hosts, localization in the host, stage reached in the host, geographical distribution, authorities and the number of alveoles or suckers present. In the systematic section there is a key to the genera, an account of those life-histories which are known and a detailed description of five species (*Aspidogaster conchicola*, *Lophotaspis vallei*, *Cotylogaster occidentalis*, *Macraspis elegans* and *Stichocotyle nephropis*) with a discussion, after each, of the morphology and anatomy of related species. Finally, there is an account of embryology and development. The paper is illustrated by more than 100 figures and there is an extensive bibliography. Much additional information is available in the 18 footnotes and one note which was added while the paper was in proof. S.W.

(191b) In this paper, to which there are 24 footnotes, Biguet *et al.* give descriptions and figures of *Microphallus debuni* n.sp. and *M. canchei* n.sp. from Charadrii and Lari on the French coast. The ornamentation of the male papilla in *M. debuni* is sufficiently different from that in other species of the genus to distinguish it from them. *M. canchei* is closely related to *M. primus* but is characterized by the presence of a limiting membrane around the seminal vesicle and prostate, and also by the asymmetry and level of insertion of the male papilla, the length of the caeca and the volume of the testes. *Spelotrema*, *Monocaeum* and *Spelophallus* are regarded as synonyms of *Microphallus* and the following are given as new combinations in the key to the species of *Microphallus*: *M. arenaria* (Belopolskaya, 1953), *M. muellhaupti* (Coil, 1956), *M. pseudogonotylus* (Chen, 1944) and *M. trilobatus* (Cable & Kuns, 1951). The Microphallidae are discussed and there is a series of tables giving hosts, geographical distribution, diagnostic features and the suggested generic and specific names of all species of *Microphallus*. There is an extensive bibliography. s.w.

(191c) Chabaud reviews the subfamily Habronematinae and restricts it to the genera *Chitwoodspirura*, *Sicarius*, *Gendrespirura* n.g. (type species, *G. hamospiculata* n.comb.), *Excisa*, *Cyrnea*—subgenera *Cyrnea* and *Procyrnea* n.subg., *Habronema* (emended), *Odontospirura* (= *Vaznema* Freitas & Lent, 1947), *Hadjelia* (= *Gilsonia* = *Parhadjelia* = *Stellobronema*? = *Stellocaronema*?), *Histiocephalus*, *Parabronema* (= *Squamanema*), *Draschia*. The genus *Hartertia* is, from a study of the larval head, referred to the Spiruridae, Spirurinae. Chabaud applies the principles he previously formulated for the evolution of cephalic structures in the Phasmodia, stressing the importance of the larval head form, and also modifies his previous ideas to include median intra-buccal invagination of the head tissue, as well as lateral. The head structure of the principal habronematine forms is described in detail and Chabaud concludes that there are two groups within the subfamily: one characterized by the cephalic invagination being mainly on the median axis (genera *Chitwoodspirura*, *Sicarius*, *Gendrespirura*, *Excisa*, *Cyrnea* and *Habronema*) and the other by the invagination being mainly on the lateral axis (genera *Odontospirura*, *Hadjelia*, *Histiocephalus*, *Parabronema* and *Draschia*). The genera are diagnosed and their species listed (except *Cyrnea*). The genus *Habronema* is restricted to the species occurring in mammals. A new genus, *Gendrespirura*, is introduced for the species occurring in edentates. Keys are given to the genera and subgenera. W.G.I.

(191d) Deblock *et al.* discuss the genus *Levinsemiella* and the characters used for distinguishing the different species. They annotate, in chronological order, the thirteen species hitherto described and describe and illustrate *Levinsemiella tridigitata* n.sp. The new form has been found in *Actitis hypoleucos*, *Charadrius hiaticula*, *Erolia testacea*, *E. ruficollis*, *E. alpina* and *Motacilla flava* but occurs only rarely and in very small numbers. The most outstanding distinguishing feature of the new species is the presence of three finger-like processes in the male copulatory organ, not four as in the classical descriptions. *L. minuta* is the only other species possibly possessing only three processes and the description of this species is too brief to give a very clear indication of its morphology. *L. howensis* and *L. cruzi* are regarded as species *incertae sedis*. There is a key to the twelve species and a table giving hosts, geographical distribution, name under which the species was originally described, bibliographical references and main diagnostic features. s.w.

(191e) Golvan considers the possible affinities of the Acanthocephala with the Turbellaria, Trematoda, Cestoda, Nematoda, Rotifera, Nemertea, Kinorhyncha, Gastrotricha, Priapulida, Nematomorpha, Tardigrada, Annelida, Arthropoda and a fossil form of uncertain standing, *Ottoia prolifica* (Walcott, 1911). He concludes that the Acanthocephala are a distinct and homogeneous phylum with a close affinity to the Priapulida and are members of the superphylum Aschelminthes. A general account is given of the anatomy, embryology and biology of the Acanthocephala and Golvan has formulated a hypothetical, ancestral, proto-acanthocephalan, to enable the similarities between the Acanthocephala and the Priapulida to be recognized more closely. According to Golvan, loss of the digestive system and invagination

of the peri-buccal region in the ancestral Protoacanthocephala has led to the hypothetical, primitive, acanthocephalan which is described in some detail, and its use in establishing a phylogenetic classification of the phylum is discussed. I.C.W.

192—Annales de la Société Belge de Médecine Tropicale.

- a. DORPE, A. VAN DEN, 1958.—“L'onchocercose oculaire dans la province du Kasai.” 38 (4), 737-768. [English, German, Spanish & Flemish summaries pp. 767-768.]

(192a) Van den Dorpe is an oculist and studied patients in the Kasai province (Belgian Congo) with the slit lamp to test its efficacy in the rapid diagnosis of onchocerciasis. In addition he carried out extensive epidemiological surveys of the disease. In some instances the results of the ocular tests were compared with those obtained from skin scrapings, and all were compared with those from patients having nodules. The slit lamp gave a higher percentage of positives than the scrapings. Microfilariae were scarce in patients with advanced ocular lesions but were abundant in the less advanced cases in the anterior chamber; they were never found in the vitreous humour. Ocular surgery must be preceded by antifilarial treatment, i.e. removal of nodules, carbilazine therapy, then antrypol. Antergan [presumably an antihistamine compound] was given at the same time as the carbilazine. Onchocerciasis constitutes a veritable scourge in the Kasai area. Van den Dorpe considers that the slit lamp is of great value in the rapid diagnosis of the disease and being powered by a six-volt car battery can readily be used in epidemiological surveys. W.K.D.

193—Annali della Sperimentazione Agraria.

- a. RUI, D. & GIRALDI, G., 1958.—“Nematodi fitoparassiti e nematocidi.” 12 (2), 481-502. [English summary pp. 501-502.]

(193a) A general section on plant-parasitic nematodes is followed by an account of the intensity and distribution of root-knot disease in the lagoon market gardens of the Chioggia area near Venice, where most crops are severely damaged. Experiments were carried out with soil fumigants, the best of which were found to be D-D and EDB. The effects of fumigation were evident in the second year after treatment as well as in the year of treatment. Large quantities of soil fumigants have been distributed freely in the area to encourage reclamation of the land. M.T.F.

194—Annals of Applied Biology.

- a. WALLACE, H. R., 1958.—“Movement of eelworms. III. The relationship between eelworm length, activity and mobility.” 46 (4), 662-668.

(194a) The speed of six species of eelworm of different habits and habitat among water droplets on a glass surface is a function of their length and activity. This principle can only be applied to movement in soil where eelworm length is less than about three times the particle diameter. Among smaller-sized particles the speed of the eelworm is influenced by particle size. With increasing eelworm length there is an increase in soil particle size for maximum mobility. H.R.W.

195—Annals and Magazine of Natural History.

- a. WILLIAMS, H. H., 1958.—“Some Phyllobothriidae (Cestoda: Tetraphyllidae) of elasmobranchs from the western seaboard of the British Isles.” Ser. XIII, 1, 113-136.
b. WILLIAMS, H. H., 1958.—“The anatomy of *Aporocotyle spinosicanalis* sp. nov. (Trematoda: Digenea) from *Merluccius merluccius* (L.)” Ser. XIII, 1, 291-297.
c. WILLIAMS, H. H., 1958.—“The anatomy of the trematode *Dictyocotyle coeliaca* Nybelin, 1941, with a discussion of its relationships with species of the genus *Calicotyle* Diesing, 1850.” Ser. XIII, 1, 465-478.

(195a) Williams describes the occurrence and characteristic features, with particular reference to the scolex and genitalia, of five species of *Phyllobothrium*, one of *Anthobothrium*, five of *Echeneibothrium* and one of *Tritaphros*. 35 figures are included. A table shows the

differences between five members of *Echeneibothrium* and an account is given of variation in *E. fallax*. *Rhinebothrium* is placed as a synonym of *Echeneibothrium*. The structure and function of the scolex in the Phyllobothriidae is discussed. It is concluded that the scolex is an adaptive structure and is not the only feature that should be taken into account in identifying a species. H.H.W.

(195b) An account is given of the external features, alimentary canal, nervous, excretory and genital systems of *Aporocotyle spinosicanalis* n.sp. from the ventricle of the heart of *Merluccius merluccius*. It differs from *A. simplex* and *A. orientalis* in the shape of the body, the margins being curved ventrally to form a canal which is spinous, in the shape of the cirrus sac and of the ovary, in the number of testes and in host distribution. H.H.W.

(195c) *Dictyocotyle coeliaca* is redescribed from specimens found in the coelom of *Raja naevus*. An account of the external features, alimentary canal, nervous and genital systems is followed by a discussion of the validity of *Dictyocotyle* and the relationships of *D. coeliaca* with seven species of *Calicotyle*. Williams states that an opisthaptor with numerous shallow loculi distinguishes *Dictyocotyle* from *Calicotyle*, this latter genus possessing seven peripheral loculi. He concludes that although *D. coeliaca* is related to *C. inermis*, *Dictyocotyle* should be retained at present. H.H.W.

196—Annals of the Natal Museum.

- a. MOORE, J. P., 1958.—“The leeches (Hirudinea) in the collection of the Natal Museum.” 14 (2), 303–340.

(196a) Moore describes and figures the following 18 leeches from South African material at the Natal Museum, *Branchellion angeli*, *Pontobdella* (*Pontobdellina*) *macrothela*, *Ottoniobdella stellata* n.sp. (Piscicolidae), *Helobdella conifera*, *Batrachobdella nilotica*, *B. amnicola* n.sp., *Placobdella multistriata*, *P. unita* n.sp., *P. jaegerskioeldi*, *P. (Parabdella) garoui*, *Marsupiobdella africana* (Glossiphoniidae), *Myxobdella africana*, *Praobdella radiata* n.sp., *Limnatis* sp., *L. oligodonta*, *L. fenestrata*, *Semiscolex congolensis* (Hirudidae) and *Salifa perspicax* (Erpobdellidae). 16 of these were taken within the limits of the Natal Province. Previously only *Democedes decemstriata*, *D. natalis* and *Aulacostomum kraussi* had been attributed to Port Natal. G.I.P.

197—Annals of Tropical Medicine and Parasitology.

- a. GILLES, H. M. & WILLIAMS, K., 1958.—“Effect of heparin *in vivo* on the release of microfilariae of *Wuchereria bancrofti* into the peripheral blood.” 52 (4), 516–517.

(197a) 12,500 international units of heparin were given intravenously at 9.55 a.m. to four patients with night counts between 500 and 1,000 microfilariae of *Wuchereria bancrofti* in 50 cu.mm. of blood, and to six other patients with smaller numbers of microfilariae. Blood samples at 10 a.m., 11 a.m., 12 noon, 2 p.m. and 4 p.m. contained no more microfilariae than samples taken on the two preceding days when no heparin had been given. Four other patients were given the same dose of heparin and the numbers of microfilariae were counted after 15, 30, 45 and 60 minutes; no significant rise in numbers was detected. W.A.F.W.

198—Archives of Internal Medicine.

- a. SWARTZWELDER, J. C. ET AL., 1958.—“Therapy of strongyloidiasis with dithiazanine.” 101 (3), 658–661.
b. DÍAZ-RIVERA, R. S., RAMOS-MORALES, F., SOTOMAYOR, Z. R. & SANTIAGO, S., 1958.—“The treatment of schistosomiasis.” 101 (6), 1151–1158.

(198a) Swartzwelder *et al.* report that dithiazanine (3,3'-diethylthiadicarbocyanine iodide), in a dosage of 200 mg. t.d.s. for 21 days, eliminated strongyloidiasis in 16 out of 18 patients treated (89%). Side reactions to therapy were infrequent, mild and evanescent. The drug also eliminated infection with *Strongyloides ratti* in 100% of rats treated. J.M.W.

(198b) Díaz-Rivera *et al.* give a brief selective account of some of the known facts relating to the treatment of schistosomiasis. They stress the importance of resistance and immunity, in view of the inefficacy of all drug treatments at present known. J.M.W.

199—Archives of Pathology.

- a. LINGARD, W. F., HUESTIS, D. W. & MACLEAN, J. T., 1958.—“Carcinoma of the liver with clonorchiasis. Report of a case presenting as hematuria and metastasis to renal pelvis.” 65 (5), 570–573.

(199a) The heavy infection with *Clonorchis sinensis* in this case was discovered only at autopsy. There were no signs or symptoms of liver disease until shortly before death. The authors remark that although malignant tumours of the liver have been recorded not infrequently in cases of infection with *Opisthorchis felineus* as well as with *C. sinensis*, it is doubtful if there is any aetiological connection between the high incidence of liver-cell carcinoma in some groups of Orientals and the prevalence of clonorchiasis. Carcinogenic factors in the diet are considered more likely to be responsible. J.M.W.

200—Berichte aus der Land- und Forstwirtschaftlichen Forschung.

- a. ANON., 1958.—“Wurmbefall bei Schweinen einer Mastprüfungsanstalt.” 5 (12), 7.

(200a) 80.7% of pigs investigated showed worm eggs in the faeces. 18.2% were infected with two species of worms, 9.9% with three species and 1% with four species. 71.9% of the animals harboured *Ascaris lumbricoides*, 26.0% nodule worms, 10.4% stomach worms and 1.6% hookworms. In almost 60% of pigs autopsied, liver inflammation due to migrating *Ascaris* larvae was found; and a high percentage of livers had therefore to be condemned. In view of these facts anthelmintic treatment of sows is a manifest duty of pig breeders. J.M.W.

201—Biochimica et Biophysica Acta.

- a. MANSOUR, T. E., 1958.—“Effect of serotonin on phenol oxidase from the liver fluke *Fasciola hepatica* and from other sources.” 30 (3), 492–500.

(201a) Mansour examined phenol oxidase from *Fasciola hepatica*. The enzyme was associated with insoluble particles and it catalysed the oxidation of phenolamines more rapidly than catechol, dihydroxyphenylalanine and tyrosine ethyl ester. Inhibition caused by diethyl-dithiocarbamate was reversed by copper ions; serotonin inhibited competitively. The phenol oxidase from the trematodes differed in several respects from the phenol oxidase found in melanomas, mealworms and mushrooms. W.P.R.

202—Biologisches Zentralblatt.

- a. HATTWICH, H. R. & ODENING, K., 1958.—“Über die Metacercariae von *Tylodelphis excavata* (Rudolphi, 1803) Szidat, 1935.” 77 (4), 489–502.
- b. MÜLLER, G., 1958.—“Morphologische Untersuchungen zur Variabilität des Kartoffelnematoden *Heterodera rostochiensis* W.” 77 (6), 673–714.

(202a) Hattwich & Odening report that 100% of some 300 *Rana esculenta esculenta* from a village in Saxony and 90% of 20 specimens of the same subspecies from the Leipzig area were infected with metacercariae of *Tylodelphis excavata*. The frogs from the Saxony village had an average infection of 407.72 metacercariae each and those from Leipzig an average of 226.44. Nearly always both brain and spinal cord of the frogs were infected. The morphology of the metacercaria is described in detail. No pathological or histological changes in the central nervous system of the frogs attributable to the infection could be demonstrated. Attempts to infect domestic ducks with the metacercaria were unsuccessful and this is taken as proof of the specificity of the parasite for its definitive host, the stork *Ciconia ciconia*. A.E.F.

(202b) Müller made extensive measurements of cysts, eggs and larvae of *Heterodera rostochiensis* from five different localities over a period of three years, and examined the results statistically. She found a correlation between cyst size and number of eggs in the cyst, but no relation between cyst size and length of the eggs. There were also definite relationships between the size of the cyst and both the length/ breadth ratio of the eggs and the larval length. Observations on eggs showed that six different shapes could be distinguished. These were related to the way in which the larva was folded within the egg-shell. Measurements of eggs and larvae showed statistically detectable differences from one locality to another and from one year to another. Within each year the egg types varied in relative frequency between the different localities. Highest values for larval length and egg size occurred in 1954 and are thought to be correlated with weather conditions, but the two measurements are independent of one another. There is an indication that variations from normal in the egg lengths in two localities may be genetically controlled. The question of the development of geographical races of *H. rostochiensis* cannot be determined on the basis of morphological variations but the absence of sufficient indication for it and the ecological adaptability shown suggest the possibility of the development of new biotypes which could endanger resistance selection.

M.T.F.

203—Boletín Chileno de Parasitología.

- a. FAIGUENBAUM, J., VACCAREZA, A., JIMÉNEZ, E., HURTADO, R., D'ACUÑA, G. & APABLAZA, A., 1958.—“Distomatosis humana. Diferentes modalidades clínicas observadas en cuatro casos.” 13 (4), 69–73. [English summary p. 69.]
- b. DONOSO, F. & DONCKASTER, R., 1958.—“Contribución al estudio de la *Hymenolepis nana*. III. Ensayo terapéutico con ditiазanina (3-3'dietilcarbocianina).” 13 (4), 73–75. [English summary p. 73.]
- c. ARENTSEN, J., PASMANIK, S. & ATÍAS, A., 1958.—“Un caso de quiste hidatídico de la órbita.” 13 (4), 81–82. [English summary p. 81.]

(203a) The clinical history of two men and two women living in or around Santiago (Chile) is given, all of whom were subsequently proved to be suffering from *Fasciola hepatica* infection. Each patient presented different clinical manifestations but characteristic symptoms were pain in the right hemi-thorax and hepatomegaly with eosinophilia. All admitted eating “watercress”. One patient had a history of intestinal disturbance extending over 21 years. Skin tests were positive. Treatment was by emetine hydrochloride. Emphasis is laid on the importance of eosinophilia in diagnosis and on the fact that the most frequent complication of fascioliasis is gall-stones.

W.K.D.

(203b) Twelve patients under 12 years old and three over 12, infected with *Hymenolepis nana* were treated by dithiazanine iodide. The dosage varied according to age, children under four receiving 400 mg. daily in tablets of 100 or 200 mg., those aged four to eight years receiving 500 mg. and those over eight receiving 600 mg. Two courses of treatment of seven days each with a ten-day interval, were given to the majority and examination of the faeces was made by a modified Telemann's method three times after the first course and six times after the end of the treatment. Of 12 persons receiving the full course only two remained negative, while the drug was not well tolerated and side effects were often severe. It is concluded that in the dosages used, dithiazanine is not satisfactory for the treatment of *H. nana* in man.

W.K.D.

(203c) A 10-year-old child was admitted to hospital with irreducible exophthalmos, chemosis and a corneal abscess of the right eye, the complete diagnosis being panophthalmitis. Enucleation under antibiotic cover was performed but four days after the operation, during dressing of the wound a number of vesicular cysts came away. After positive Casoni and Weinberg tests a further operation for the removal of any remaining was performed. Post-operative treatment with a hydatid antigen was given [dosage and type not stated]. The difficulty in clinical diagnosis is emphasized especially as the eosinophil count was normal.

W.K.D.

204—British Journal of Pharmacology and Chemotherapy.

- a. GOODWIN, L. G., 1958.—“A method for recording the effects of anthelmintics on the movements of *Ascaris lumbricoides*.” **13** (2), 197–201.

(204a) The difficulties and disadvantages of ligation or stitching for attachment of *Ascaris lumbricoides* to a kymograph recording lever were overcome by enclosing the worm in a fine nylon stocking of suitable size and then recording the movements of the stocking. The light-sensitive tip of the worm was hooded by a small black glass cap. The preparation was immersed in a vertical tube of Tyrode solution maintained at 37°C. in a water bath. Drugs under test were introduced into the Tyrode solution and the effect recorded. Piperazine citrate at a concentration of 1:250 narcotized the worms in about six hours. Lower concentrations took proportionally longer to produce the same effect. No stimulation occurred and some degree of recovery took place when the test medium was replaced by drug-free medium. Male worms were ten times as sensitive to piperazine as female worms. Hexylresorcinol was about 100 times as active as piperazine but caused marked stimulation before death. Chenopodium oil, emulsified with bile salts, immobilized the worms in a few minutes at a concentration of 10^{-4} . Santonin at 10^{-3} caused inco-ordination of the anterior end of the worms but did not produce general immobility. Tetrachlorethylene in emulsion stimulated the worms to violent convulsive activity after which they remained for many minutes in contracture. The stimulation or inco-ordination produced by the other drugs compared with the narcotization produced by piperazine suggests strongly that the latter is the safest drug for the treatment of ascariasis. O.D.S.

205—British Medical Journal.

- a. FORSYTH, D. M., 1958.—“Visual disturbances associated with trivalent antimony salts. A report of two cases.” Year 1958, **2** (5107), 1272–1273.
b. GOODWIN, L. G., JAYEWARDENE, L. G. & STANDEN, O. D., 1958.—“Clinical trials with bephenium hydroxynaphthoate against hookworm in Ceylon.” Year 1958, **2** (5112), 1572–1576.
c. ROGERS, E. W., 1958.—“Excretion of bephenium salts in urine of human volunteers.” Year 1958, **2** (5112), 1576–1577.

(205a) Forsyth reports two cases of optic neuropathy in young male Kuwaitis who had been and were still receiving treatment for schistosomiasis (*Schistosoma haematobium*). One patient had amoebiasis as well. Both had severe reduction of vision in one eye following a course of treatment with sodium antimony tartrate and one had in addition, haemorrhages and exudates at the macula. Vision subsequently returned to normal in both cases. The patients developed symptoms within a few days of each other, and Forsyth points out that optic neuropathy associated with trivalent antimony compounds has not previously been reported. W.K.D.

(205b) The bromide, 2-hydroxy-3-naphthoate and embonate of bephenium (benzyl-dimethyl-2-phenoxyethylammonium cation) were taken to clinical trial against infections of *Necator americanus* in Ceylon. In preliminary trials in hospital the more soluble bromide and least soluble embonate proved less efficacious or less reliable than bephenium hydroxynaphthoate, a salt of low but intermediate solubility. The hydroxynaphthoate was selected for field trials. In all, tests with bephenium salts and control tests with tetrachlorethylene were carried out on 284 infected persons with widely varied weight of infection; the initial egg counts ranged from 80,000 to 100 eggs per ml. of faeces. Bephenium hydroxynaphthoate was given as suspension in single doses of 2.0 to 3.0 gm. of base or as multiple doses on successive days or three times on the same day. In groups of patients treated under different conditions the egg count was reduced in 86–89% and compared favourably with a standard dose of 30 minims of tetrachlorethylene. Pre-treatment purgation offered no advantage; a purge given with the dose reduced drug efficiency; concurrent treatment with piperazine did not enhance or antagonize the activity of bephenium; multiple-dose treatment with smaller doses on four or five successive days was rather more efficacious than the single large dose

given in mass treatment. In the field trials in patients with mixed infections of hookworm and roundworm, 77% of *Ascaris* infections were cleared with a single 3.0 gm. dose of bephenium base. Bephenium hydroxynaphthoate was particularly suitable for the treatment of small children with advanced anaemia, diarrhoea and heavy hookworm infections because of its low toxicity and because no purge was necessary. No toxic side effects were observed when large doses of bephenium were given. O.D.S.

(205c) Rogers describes the technique developed for the estimation of bephenium excreted in human urine and presents the estimated excretion rates in volunteers who had taken the drug by mouth. In 18 volunteers, three were given bephenium bromide, five bephenium hydroxynaphthoate and ten bephenium embonate to observe differences in excretion rate in relationship to differences in solubility. The size of dose ranged from 1.0 to 3.0 gm. as a single dose, 2.0 gm. three times in one day, or 2.5 gm. daily for three or four days. (All dosage is in terms of base.) Total urines were collected for 24 hours after the single dose and throughout the experiment where multiple doses were given. The excretion rate of bephenium was low, with some individual variation, but was higher in those given the more soluble bromide than with the less soluble hydroxynaphthoate, whereas the almost insoluble embonate was excreted in still smaller amounts. The bromide gave rise to some nausea and vomiting but with the hydroxynaphthoate and embonate, side effects were slight, some volunteers complaining of mild diarrhoea and borborygmi. O.D.S.

206—British Veterinary Journal.

- a. BLACK, W. J. M., THOMAS, R. J. & GREASLEY, J., 1958.—“The control of *Nematodirus* infestation by preventive treatment.” 114 (12), 470–477.

(206a) Young lambs with mixed infections of *Nematodirus battus* and *N. filicollis* were dosed with 5 ml. of Complex 414 (a Bayer product) or 1 oz. of acidic piperazine phosphate on April 15th when the numbers of larvae on the pasture had reached their peak. Dosing was repeated every 11–14 days till July 5th. The egg counts for *N. filicollis* were little affected; those for *N. battus* dropped appreciably, the peak figures being 1,063 e.p.g. in the controls, 328 e.p.g. in lambs given Complex 414 and 218 e.p.g. in lambs dosed with piperazine. The number of voided trichostrongyle eggs increased after dosing and it is suggested that treatment for *Nematodirus* be combined with phenothiazine administration to control other gastrointestinal nematodes. M.MCK.

207—Bulletin de l'Académie Polonaise des Sciences. Classe II. Série des Sciences Biologiques.

- a. PROST, M., 1958.—“On the occurrence of *Dactylogyrus extensus* Mueller et v. Cleave, 1932, in Poland.” 6 (4), 151–155.
 b. JARECKA, L., 1958.—“Cladocera as the intermediate hosts of certain species of Cestoda. Life cycle of *Anomotaenia ciliata* (Fuhr., 1913) and *Hymenolepis furcifera* (Krabbe, 1869).” 6 (4), 157–166.
 c. KISIELEWSKA, K., 1958.—“Cysticeroid of the tapeworm *Neoskriabinolepis singularis* (Chołodkovsky, 1912), Spassky, 1954, in a beetle of the family Catopidae.” 6 (5), 205–208.
 d. KOZICKA, J., 1958.—“Plerocercoid *Diphyllbothrium* species from *Coregonus albula* L.” 6 (5), 209–213.
 e. KORPACZEWSKA, W., 1958.—“*Diphyllbothrium dendriticum* Nitsch, 1824, from Lake Northern Mamry, Poland.” 6 (7), 299–303.
 f. NIEWIADOMSKA, K., 1958.—“*Paracoenogonimus viviparae* (Linstow, 1877) Sudarikov, 1956 (Trematoda, Cyathocotylidae) from the Mamry Lake, Poland.” 6 (7), 305–308.
 g. JARECKA, L., 1958.—“Life cycle of *Orlovilepis megalops* (Nitsch in Creplin) Spassky et Spasskaya, 1954.” 6 (8), 335–338.
 h. RYBICKA, K., 1958.—“*Pseudodiorchis kampinosi* n.sp. (Cestoda, Hymenolepididae) a new cestode from the shrew *Sorex araneus* L.” 6 (8), 339–345.
 i. KOZICKA, J. & NIEWIADOMSKA, K., 1958.—“Life cycle of *Paracoenogonimus viviparae* (Linstow, 1877) Sudarikov, 1956 (Trematoda, Cyathocotylidae).” 6 (9), 377–382.

- j. PRZYJAŁKOWSKI, Z., 1958.—“Investigations on the transmission of *Salmonella typhimurium* in animals by migrating nematode larvae.” 6 (9), 383–388.
k. SULGOSTOWSKA, T., 1958.—“Individual variation in *Tanaisia fedtschenkoi* Skriabin, 1924, in relation to the intensity of infestation.” 6 (9), 389–392.

(207a) Prost considers that there is no doubt that *Dactylogyrus solidus* is a synonym of *D. extensus* and that *D. hovorkai* is also synonymous. He records *D. extensus* for the first time on carp in Poland. I.L.O.

(207b) For the first time, according to Jarecka, species of Cladocera are reported as intermediate hosts for cestodes, namely, *Anomotaenia ciliata* and *Hymenolepis furcifera*. Adult *A. ciliata* occurred in *Anas platyrhynchos* and *Nyroca ferina*. *Simocephalus expinosus* was proved experimentally to be the intermediate host of *A. ciliata* in Lake Gołdapiwo. Adult *H. furcifera* were recovered from *Podiceps cristatus*. Feeding experiments and a single case of natural infection indicate that species of Cladocera (*S. expinosus*, *Eurycercus lamellatus*, *Ceriodaphnia reticulata*) are the intermediate hosts of *H. furcifera* in the lakes Gołdapiwo and Northern Mamry. Jarecka states that the vigorous movements of the body and embryonic hooks inside the egg are characteristic features of the oncospheres of *H. furcifera*. Developmental variation between the size and form of the hooks of the cysticeroid and adult makes it impossible to study natural infection of *H. furcifera* except through feeding experiments. Jarecka suggests that infection of *P. cristatus* is seasonal. I.L.O.

(207c) Kisielewska reports on the cysticeroids of the tapeworm *Neoskrjabinolepis singularis* found in a beetle of the family Catopidae. The adult form occurs in the following Insectivora: *Sorex araneus araneus* L., *S. minutus*, *S. macropygmaeus karpinskii*, *Crocidura leucodon* and *Sorex* sp. The hooks on the cysticeroid are almost the same size as those of the adult worm and their shape is very characteristic: a thin and short handle, long and pointed blade, guard shorter than the blade, broad and terminally rounded. Scolex and suckers as well as hooks vary considerably in size. I.N.J.

(207d) *Diphyllbothrium plerocercoids* were found encysted on the external stomach wall of *Coregonus albula* from the lakes Gołdapiwo and Northern Mamry. Kozicka considers the plerocercoids to correspond most closely to those described by Kuhlrow [for abstracts see Helm. Abs., 22, Nos. 62a & 62b] as *D. osmeri*, but hesitates to assign them to this species owing to the absence of *D. osmeri* from piscivorous birds examined during the same period. I.L.O.

(207e) *Diphyllbothrium dendriticum*, recovered from *Larus ridibundus* and *L. canus*, is redescribed briefly. Facts are given concerning the inhibitory effects of heavy worm burden on the body size and development of the parasite. Korpaczewska considers that identification of *D. dendriticum* can be based mainly on five characters, namely, shape of uterus and ratio of its length to breadth; length and breadth of the head and shape of bothria; length and breadth of the neck; number, size and location of testes; location of the first uterine horns in relation to the cirrus pouch. I.L.O.

(207f) *Paracoenogonimus viviparae* recorded from *Circus aeruginosus* and *Buteo buteo* (Falconiformes) and *Mergus merganser* (Anseriformes) is redescribed. Specimens from the different hosts varied in size; a fact Niewiadomska attributes to the different intestinal conditions encountered. One *Viviparus viviparus* out of 600 examined, contained a metacercaria resembling that of *P. viviparae*. Attempts at infecting a specimen of *Viviparus* experimentally with cercariae failed but various species of fishes were successfully infected. I.L.O.

(207g) Jarecka reports on the life-cycle of *Orlovilepis megalops* from *Nyroca ferina* and gives an illustrated description of the egg and cysticeroid. Attempts to infect various species of Copepoda and Ostracoda gave positive results only with *Cypris pubera*, in which all 50 specimens became infected after ingesting eggs from adult worms in *N. ferina*. Absence of young worms in ducks in the summer indicated that infection of the definitive host coincides

with the seasonal occurrence of *C. pubera* in the spring. The finding of naturally infected specimens of *C. pubera* in Lake Mamry suggests that *C. pubera* is the natural intermediate host of this parasite.

N.J.

(207h) Rybicka describes *Pseudodiorchis kampinosi* n.sp. from the intestine of the shrew *Sorex araneus* L. found in the Kampinoska Forest near Warsaw during the summer of 1957. In two of the host animals 1,500 specimens and 2,300 specimens of the new species were found respectively. A specific diagnosis and description, with eight illustrations, of *Pseudodiorchis kampinosi* n.sp. is given together with a discussion and table of the main characteristics differentiating the new species from *P. multispinosa* Żarnowski, 1955. Rybicka considers that *P. kampinosi* differs from *P. multispinosa* chiefly in the shape, number and size of the rostellar hooks, 80 to 120 in number and 7μ long in the new species as compared with 120 to 130 and 5.5μ in the latter species. It also differs in the dimensions and principal features of the strobila, scolex and rostellum; and in the total length of the new species, 0.67 mm. to 0.9 mm., as against 0.35 mm. to 0.6 mm.; with 36 to 52 proglottides as compared with 18 to 20 proglottides respectively. Rybicka discusses the differences between *P. kampinosi* and another cestode parasitic in shrews, namely, *Protogynella blarinae*.

I.C.W.

(207i) The authors, having found in Northern Mamry lake adult *Paracoenogonimus viviparae* in *Circus aeruginosus*, *Buteo buteo* and *Mergus merganser*, and thread-like sporocysts containing cercariae in *Vivipara* spp., decided to make a repeated investigation of the life-cycle of this fluke. (Previously partially studied by Katsurada in 1914 and Komyia in 1938.) Experimental infection of fish with cercariae was successful in *Scardinius erythrophthalmus*, *Carassius carassius*, *Esox lucius*, *Rutilus rutilus* and *Abramis brama*, while the metacercariae occurred naturally in the last three and in *Tinca tinca*, *Leuciscus leuciscus*, *L. idus*, *Blicca bjoerkna* and hybrids of *Blicca*, *Abramis* and *Rutilus*. When metacercariae from the naturally infected fish were fed to *Circus aeruginosus*, the adults developing were identical with those found naturally in the birds. The cercaria and metacercaria are described.

G.I.P.

(207j) Przyjałkowski conducted experiments on mice to investigate the effect of migrating larvae of *Ascaris suum* and *Trichinella spiralis* on the penetration of *Salmonella typhimurium*, in sub-infective and smaller doses, inside the host. He found that conditions favourable to bacteraemia exist in mice even without the presence of helminths but that migrating larvae of *A. suum* or the adults and larvae of *T. spiralis* increased the unfavourable effects on the host. Evidence is presented to show that transmission of *S. typhimurium* does not take place on the body of the larvae of *A. suum* or by way of the encapsulated larvae of *T. spiralis*. Experiments are described and evidence presented to show that attack by larvae of *A. suum* after previous infection from sub-lethal doses of *S. typhimurium* favours bacteraemia. The author concludes that the results obtained do not confirm Gerbilski's findings [for abstract see Helm. Abs., 15, No. 630n] and that bacteraemia tends to appear after the seventh day following infection with larvae and bacteria and not the third day as Gerbilski reported.

I.C.W.

(207k) Sulgostowska collected the fluke *Tanaisia fedtschenkoi* from the kidneys of *Larus ridibundus* during four consecutive summers and concludes that the intensity of infection affects the morphology of the fluke within a population. Increasing density of the population tends to reduce the dimensions of particular specimens and results in the genitalia being less well developed.

I.L.O.

208—Bulletin Agricole du Congo Belge.

- a. VERSYCK, M. & JACOB, H., 1958.—“La lutte anti-ténia dans l'Ituri.” 49 (1), 155-164. [Flemish summary p. 164.]

(208a) Bovine cysticerciasis is a serious problem in Southern Ituri, the number of infected cattle in the Bogoro-Gety zone being estimated at no less than 70% to 80% in the period 1953-55. Versyck & Jacob briefly review contributory factors and then describe the measures taken to meet this situation which comprise taeniocidal treatment of the human

population; cooking of all meat; installation of latrines; improvement of byres for cattle; enclosure of pastures; and provision of drinking troughs. These measures are meeting with increasing success and bovine cysticerciasis is becoming from day to day a less serious health matter. J.M.W.

209—Bulletin of Epizootic Diseases of Africa.

- a. DINNIK, J. A. & DINNIK, N. N., 1958.—“Observations on the development of *Haemonchus contortus* larvae under field conditions in the Kenya Highlands.” 6 (1), 11–21. [French summary pp. 69–70.]
- b. DINNIK, J. A., 1958.—“Identification of liver fluke and stomach fluke eggs recovered from faeces of infested animals.” 6 (2), 135–139. [Also in French pp. 185–189.]
- c. GINSBERG, A., 1958.—“Helminthic zoonoses in meat inspection.” 6 (2), 141–149. [French summary pp. 190–192.]

(209a) Dinnik & Dinnik observed the development of larvae of *Haemonchus contortus* in pulverized faeces placed in glass jars and in faecal pellets placed on grass exposed to different amounts of sunlight. The results were compared with those obtained by incubating cultures in the laboratory. The work was done at Kabete where the mean air temperature is high and does not vary greatly from month to month although the diurnal variation may exceed 30°F. The results show that while development was inhibited by dry conditions no development occurred when there was adequate moisture and a mean maximum temperature of 72°F. if the mean minimum temperature fell below 52°F. The authors counsel caution in applying Dinaburg's criteria where the diurnal variation in temperature is great. [See also Helm. Abs., 13, No. 224c.] H.D.C.

(209b) Dinnik recommends sedimentation of faeces for the concentration of fluke eggs. Eggs of *Fasciola hepatica* and *F. gigantica* are readily distinguished from those of other flukes parasitic in ruminants by their yellowish-brown shells and by the position of the embryo near the operculum. Twenty species of stomach flukes have been recorded from domestic ruminants in Africa, all belonging to the Paramphistomidae. The eggs of twelve of these species were examined for diagnostic characteristics. All were ellipsoidal in outline, rounded at both poles, and were provided with a thin, hyaline, colourless shell having a delicately outlined operculum at one end. The eggs of the following three species only showed differential characters: *Paramphistomum microbothrium*, in which the shell was thicker, yellowish, and the egg very large (160–200 μ by 80–100 μ); *P. sukari*, in which there was resemblance to the eggs of *P. microbothrium* except for the slightly smaller size (140–165 μ by 71–92 μ); and *Calicophoron raja*, in which the embryo was in a more advanced stage of development (late morula to tadpole stage) than other paramphistomes. J.M.W.

(209c) Ginsberg discusses some meat-borne helminthic zoonoses which may be encountered during routine meat inspection in Kenya. Hydatidosis has a high incidence in sheep and goats but human cases are few, suggesting that wild carnivores and not domestic dogs are the principal carriers. Cysticerciasis is prevalent in cattle and presents a serious economic and public health problem. Intra-uterine infection is confirmed and cysticerciasis in 2-day-old to 14-day-old calves is recorded. Cysticerciasis in pigs is negligible. Trichinelliasis is not yet confirmed in Kenya. More and better abattoirs, health education and the systematic use of taeniocidal drugs would reduce the over-all incidence of helminthic zoonoses. J.M.W.

210—Bulletin. Louisiana Agricultural Experiment Station.

- a. HOLLIS, J. P. & FIELDING, M. J., 1958.—“Population behavior of plant parasitic nematodes in soil fumigation experiments.” No. 515, 30 pp.

(210a) From a series of 21 soil fumigation experiments 15 were selected for statistical analysis to investigate the occurrence and activities of plant-parasitic nematodes on important crop plants. Nematode genera most commonly encountered were *Pratylenchus*, *Trichodorus*, *Tylenchorhynchus*, *Xiphinema*, *Hoplolaimus* and *Helicotylenchus*. The distribution of these

species was independent of soil type. *Pratylenchus*, *Trichodorus* and *Tylenchorhynchus* showed intra-seasonal fluctuations and a reduction of the populations by fumigants during the growing season. Fluctuations in populations of these species were related to soil moisture changes. Hollis & Fielding suggest that particular genera have characteristic population trends and reactions to soil fumigants. Fumigants in descending order of effectiveness were Dowfume Mc-2, Nemagon, Dowfume W-85, and D-D mixture. It is suggested that the effectiveness of nematicide fumigants varies inversely as their vapour pressure. By considering the variables of fumigant vapour pressure and relative population recovery of nematodes after fumigation it is possible to understand more clearly the interaction between fumigants and nematodes.

H.R.W.

211—Bulletin de la Société Neuchâteloise des Sciences Naturelles.

- a. DUBOIS, G., 1958.—“Quelques Strigeida (Trematoda) de la collection R.-Ph. Dollfus.” **81**, 55-67.
- b. DUBOIS, G., 1958.—“Les Strigeida (Trematoda) de Californie de la collection June Mahon.” **81**, 69-78.
- c. EUZET, L., 1958.—“Sur le développement post-larvaire des Microcotylidae (Monogenoidea, Polyopisthocotylea).” **81**, 79-84. [English & German summaries p. 84.]
- d. JOYEUX, C. & BAER, J. G., 1958.—“Quelques modalités du cycle évolutif d'*Opisthioglyphe ranae* (Fröhlich) (Trematoda).” **81**, 85-111. [English summary p. 110.]

(211a) Dubois reports on a small collection of strigeids from various hosts and localities. Among the ten species present four were new to science. These, *Parastrigea intermedia* and *Cotylurus hebraicus* are described and illustrated. *Neodiplostomum dollfusi* n.sp., of which two specimens were collected from the intestine of a *Neotis cafra* at Brazzaville, is (with the exception of *Neodiplostomum laruei* which is much the same size) larger than the other species of the genus with the anterior testis symmetrically developed; the new species may be distinguished from *N. laruei* by the different proportion of fore-body to hind-body, the position of the ventral sucker, the length of the pharynx and the host. One specimen of *N. roussetoti* n.sp. was found in the small intestine of *Strix woodfordi nuchalis* at Brazzaville; this species resembled *N. cochleare* var. *japonicum* but the ovary is situated further forward, the three gonads are better developed on the left side and the vitelline glands do not extend more than half-way between the acetabulum and pharynx. *Posthodiplostomum bi-ellipticum* n.sp., of which two specimens were recovered from the small intestine of *Butorides striatus atricapillus* at Brazzaville, is very close to *P. nanum* but is larger, has the two segments of the body equal in size and form, the pharynx relatively much smaller than the oral sucker and a different geographical distribution. *Prosostephanus natricis* n.sp. is described from five specimens from the intestine of *Natrix maura* in Tunisia; the inclusion of this species in this genus necessitates replacing in it *Prosostephanus parvoviparus* Faust & Tang, 1938, which the author had assigned to *Duboisia* in 1951, and emending the genus. S.W.

(211b) Five species of strigeids were present in this collection, four from California and one from Honolulu. Dubois identifies them as *Apharyngostrigea cornu* from *Nycticorax nycticorax hoactli*, *Hysteromorpha triloba* from *Phalacrocorax auritus albociliatus*, *Mesostephanus microbursa* from *Pelecanus occidentalis californicus*, *M. fajardensis* from *Sula sula* from Honolulu and *Cotylurus strigeoides* n.sp. This new species, of which two examples were collected from the intestine of *Anas acuta tzitzihua*, is described and illustrated; it is comparable to *C. hebraicus* but may be distinguished by the size of the oral sucker and pharynx (which are far larger in proportion to the body length), the ratio of the lengths of the two segments, the erratic distribution of vitelline follicles in the anterior segment, the host and the geographical distribution. S.W.

(211c) Euzet has studied the early stages of *Microcotyle chrysophrii* on fish. The youngest differs little from the oncomiracidium but has lost the lateral cilia, the eye spot and the posterior cone, and the pharynx is further forward. The first four pairs of clamps develop successively from the posterior end forwards, replacing the larval hooks but the fifth pair

arises in front of the larval haptor, followed by a sixth pair in front of the fifth. The small posterior tongue has always disappeared by the time the sixth pair of clamps is developed, and sometimes at the appearance of the fifth pair, but never earlier as in *M. gotoi*. The oncomiracidium and first fixed stage of *M. sargi* are also described. S.W.

(211d) Joyeux & Baer have continued their study of the life-cycle of *Opisthioglyphe ranae* in central France and have confirmed experimentally the observations made under natural conditions. The classical three-host cycle can be condensed to one with only two hosts, the cercariae leaving the snails encysting in the buccal cavities or bronchial culs-de-sac and being liberated into the gut, where they become adult, at metamorphosis. *Lymnaea ovata* is the principal intermediary in this region and the trematode larvae survive the winter in these molluscs, providing the molluscs are adult. Toads and *Rana dalmatina* are unfavourable definitive hosts; *Triturus helveticus* is a favourable host in the early part of the year and plays a considerable part in spreading the infection, but when it adopts terrestrial habits it loses its infection; *R. esculenta* is, naturally, a very favourable host, harbouring the parasite throughout the year; *Hyla arborea* is the experimental host of choice and keeps the infection well in captivity, a frog killed 311 days after exposure still having active *O. ranae* in the intestine. A phenomenon of protection was found to occur which closely resembled premunition; metacercariae introduced into frogs with an active primary infection either failed altogether to establish themselves or re-encysted in the gut wall. S.W.

212—Bulletin de la Société de Pathologie Exotique.

- a. DARBON, A., PORTAL, A., MORILLEAU, R. & JAME, P., 1958.—“Un cas de distomatose hépatique à *Clonorchis sinensis* traité et guéri par la chloroquine (nivaquine) après échec de l'émetine.” 51 (4), 511–514.
- b. BÉNEX, J., LAMY, L. & LAMY, H., 1958.—“Présentation de microphotographies relatives à l'histopathologie de la bilharziose expérimentale à *S. mansoni*.” 51 (4), 514–515.
- c. LAHITTE, F. G. & GAMET, A., 1958.—“Infarctus du colon sigmoïde et schistosomiase intestinale.” 51 (4), 516–520. [English summary pp. 519–520.]
- d. JANSSENS, P. G., BOGAERT, L. VAN, TVERDY, G. & WANSON, M., 1958.—“Réflexions sur le sort des microfilaries de *Loa loa* dans l'organisme humain parasité. Manifestations viscérales provoquées par leur infiltration dans les tissus.” 51 (4), 632–645.
- e. CHARMOT, G. & REYNAUD, R., 1958.—“Le tétrachloréthylène dans le traitement de l'ankylostomose du jeune enfant.” 51 (4), 645–652.

(212d) Janssens *et al.* discuss the work of previous authors and their own studies on the behaviour in the host of microfilariae of *Loa loa* and of the microfilariae of some experimental infections. They believe that microfilariae are non-pathogenic in normal hosts, but that in some few hyperimmune human cases of loiasis the microfilariae escape from the blood vessels into the visceral tissues where they provoke inflammatory lesions and sclerosis. Such lesions are diffuse in the heart, lungs, kidney and brain, and localized in the liver and spleen. The escape of the microfilariae from the vessels is interpreted as resulting from the unsuitability of blood containing a high titre of antibodies. These antibodies are thought to be formed on the destruction of microfilariae, which begins early in the course of infection with *L. loa*, and perhaps to be a response to particular fractions of the microfilaria, such as the central internal body when this is present. Piperazine therapy is attended by massive destruction of microfilariae resulting in anaphylactic or allergic reactions the symptoms of which are different from those observed in untreated hyperimmune cases. Following piperazine therapy the authors found damage to microfilariae in the blood and to a lesser extent to those in the cerebro-spinal fluid. This shows that piperazine has a direct action on the microfilariae, and also shows that microfilariae in the cerebro-spinal fluid have come from the blood, since piperazine does not reach the cerebro-spinal fluid. The authors believe that the occurrence of microfilarial nerve lesions is now well proved, but that the pathogenic role of microfilariae in other organs such as the heart and lungs is still in doubt; the fact that when piperazine is administered the microfilariae escape into the tissues from the vessels of most of the organs, but that no reaction occurs in the lungs, whose capillaries contain very large numbers of

microfilariae, is particularly puzzling. It is concluded that these parasites are potential attackers of nearly all organs, but that the condition produced is determined by the density of the microfilariae and the sensitivity of the individual host.

W.A.F.W.

(212e) Charmot & Reynaud, working in Brazzaville, successfully treated 50 children aged from four months to five years for ancylostomiasis with tetrachlorethylene in a dosage of 0.1 ml. per kg. body-weight. They consider that this drug provides the most satisfactory treatment for this infection and that it can safely be used even for the youngest children. However, three children died following treatment, indicating that the drug must be used with caution when kwashiorkor, pronounced hepatomegaly or other serious conditions are concurrently present. Dietary treatment plays an important role in clinical cure.

J.M.W.

213—Bulletin of the World Health Organization.

- a. PESIGAN, T. P. ET AL., 1958.—“Studies on *Schistosoma japonicum* infection in the Philippines. 1. General considerations and epidemiology.” **18** (3), 345-455. [French summary pp. 452-453.]
- b. PESIGAN, T. P. ET AL., 1958.—“Studies on *Schistosoma japonicum* infection in the Philippines. 2. The molluscan host.” **18** (4), 481-578. [French summary p. 577.]
- c. McMAHON, J. P., HIGHTON, R. B. & GOINY, H., 1958.—“The eradication of *Simulium neavei* from Kenya.” **19** (1), 75-107. [French summary pp. 106-107.]
- d. NELSON, G. S., 1958.—“Staining of filarial larvae in insects before dissection.” **19** (1), 204.
- e. PESIGAN, T. P. ET AL., 1958.—“Studies on *Schistosoma japonicum* infection in the Philippines. 3. Preliminary control experiments.” **19** (2), 223-261. [French summary p. 260.]
- f. VAN DER SCHALIE, H., 1958.—“Vector snail control in Qalyub, Egypt.” **19** (2), 263-283. [French summary p. 283.]
- g. ANTONIPULLE, P., DAVID, H. V. & KARUNARATNE, M. D. R., 1958.—“Biology and control of *Taeniorhynchus* (*Mansonioides*) *uniformis* Theobald, the chief vector of rural filariasis in Ceylon.” **19** (2), 285-295. [French summary p. 295.]

(213a) Pesigan *et al.* report on the general results of the schistosomiasis pilot control project in Leyte in the Philippine Islands. A brief introductory section deals with the geography and climate of Leyte and describes the general public health situation, also the social structure of the communities. There follows a short historical account of the occurrence of *Schistosoma japonicum* in the Philippines. The methods and objectives of the control project are described in some detail and the data collected on the incidence of schistosomiasis are discussed and related to social circumstances. Attempts toward making a quantitative estimate of the economic effects of the disease are made in terms of disability and disease. The final section of the paper is concerned with the parasite itself in its definitive hosts. Experiments designed to investigate the possibility that different strains of the schistosome occur in various definitive hosts proved that no such differences exist. The implications of this finding from the point of view of control measures are discussed and the naturally occurring infection rates in different animals are shown. The rate of egg-laying in experimental animals is reported and the total egg production of adult female worms is estimated.

C.W.

(213b) In this second part of the general report from the schistosomiasis pilot control project in the Philippine Islands, Pesigan *et al.* discuss the role of the molluscan intermediate host, *Oncomelania quadrasi*. The paper begins with an account of the geographical distribution of the snail in relation to the topography of the islands. This is followed by a description of the most usual types of habitat and the physical and chemical characteristics of these places, together with the distribution of the snails within the habitats. Under the heading of behaviour and activity the effects of humidity and air temperature on copulation, climbing and general movement are considered. Light intensity and atmospheric pressure in relation to crawling activity are discussed. Periodicity in egg-laying and feeding were investigated and it was found that egg-laying was more frequent at night while the feeding rate was faster during the day. The section on the life-history of *O. quadrasi* includes data on growth, reproduction, copulation, egg-laying and survival. This is followed by a discussion of sampling methods and observations on population densities in the field together with data on the age and sex composition of the

populations, their reproduction and survival rates. The second half of the paper is devoted to the inter-relationship between *Schistosoma japonicum* and *O. quadrasi*. The technique of laboratory infection of snails is described and experiments designed to test whether miracidia showed a preference for male or female snails are reported. The effects of schistosome infection upon the reproduction, growth and longevity of snails are described. The remainder of the paper is concerned with cercarial output by snails and the detection of cercariae in the field with consequent studies on distribution of cercariae in nature. C.W.

(213c) McMahon *et al.* review the measures by which *Simulium neavei* has been virtually eradicated from Kenya. A historical review is followed by a description of the endemic foci in Nyanza Province and the various surveys which have been carried out there during the last ten years. Survey techniques (for adult flies, larvae and pupae) are described. The eradication campaigns involved treatment of infested water-courses with D.D.T., at the rate of 0.5 p.p.m. for brooks and small streams and 1 p.p.m. for large rivers, for 30 minutes once every ten days during a three-month cycle. Larvicidal measures were most effective when begun two or three weeks before the end of the rainy season. Costs for both surveys and eradication campaigns are given, and minimum requirements for transport are indicated. In a series of annexes the authors give information concerning: (i) the concentrations of D.D.T. which cause the death of fish and the migration of crabs, which were higher than those used in the campaigns; (ii) special measures adopted for use in trout streams; (iii) larviciding and checking operations; (iv) other species of Simuliidae concerned in phoresis; (v) fresh-water crabs in Kenya rivers; and (vi) larviciding equipment. Only a very small area of Kenya now remains infested with *S. neavei*, and this is in course of being treated by the Uganda medical authorities since it forms part of a much larger focus occurring in that country. J.M.W.

(213d) Nelson recommends the following modification of Lebie's technique [Lebie, B. (1950) Une nouvelle théorie endémiologique. (Privately published—Imprimerie Darantière, Dijon)] for demonstrating filarial larvae in preserved mosquitoes and blackflies: after collection the specimens are killed and placed immediately in 80% ethyl alcohol, where they can be kept indefinitely. They are then taken through descending dilutions of alcohol to distilled water, stained for three days in Mayer's acid haemalum at room temperature, differentiated for three days in distilled water, and finally transferred to pure glycerol to await dissection. J.M.W.

(213e) Pesigan *et al.* conclude their report on the pilot bilharziasis control project in the Philippine Islands with an account of preliminary experiments in control. Conditions in the project area are at present unsuitable for the use of chemical molluscicides, consequently the control methods used have all been based on the physical alteration of snail habitats and the sanitary disposal of faeces. Experiments involving clearing of vegetation from streams, drainage of swamps and deepening stream beds are described and their costs are presented together with an assessment of the results achieved. Special attention has been given to control methods on farm land which involve improved methods of agriculture and increased rice yields. The structure of suitable types of pit latrines is described and their effect on reducing snail infection rates is reported. C.W.

(213f) Van der Schalie describes the work and results of the bilharziasis control project in Qualyub, Egypt. Preliminary surveys of snail populations were made and their infection rates recorded. Mass treatment of all the canals in the area with copper sulphate was carried out allowing a minimum concentration of 30 p.p.m. and this was followed by regular checks and further treatment where snails were found. Despite this, after one year the snails were still common although present in about half the numbers but the infection rates were still more or less unchanged. The conclusion is reached that molluscicidal operations by copper sulphate alone, even in the nearly ideal conditions of an irrigation system, are prohibitively expensive and the results do not justify this expense. C.W.

(213g) Dwellings at Induruwa, a village on the west coast of Ceylon, were sprayed with D.D.T. powder dispersed in water (50 gm. per litre, giving 85 mg. per square foot of wall surface). For six months after a first spraying and four months after a second spraying, there was a reduction in the numbers of *Taeniorhynchus* (*Mansonioides*) *uniformis* caught in dwellings (217 before spraying; 3-65 after spraying) and a reduction in the numbers of *T. (M.) uniformis* infected with filarial larvae (9 before spraying; 0-3 after spraying). The numbers of *T. (M.) uniformis* caught in traps baited with cattle were also reduced. *Pistia* and *Salvinia* plants had been cleared from the area before the experiments and it was found that the mosquitoes were breeding on eleven other plants, in particular *Isachne australis*, which infests the paddy fields during the wet seasons. The adult mosquitoes preferred slightly damp, shady and sheltered resting places outside dwellings. They are nocturnal feeders; showing a biting rate highest from 6-9 p.m., except during periods of full moon, when it was nearly constant from dawn to dusk and higher than during other phases of the moon. The mosquitoes were also attracted to dwellings where night lamps were used.

W.A.F.W.

214—C.S.I.R.O. Wildlife Research. Melbourne.

- a. MYKYTOWYCZ, R. & HESTERMAN, E. R., 1958.—“On the occurrence of coccidial oocysts and nematode ova in soft and hard faeces of the wild rabbit, *Oryctolagus cuniculus* (L.).” 3 (2), 142-143.

(214a) The authors made comparative faecal counts of nematode ova from hard and soft faecal pellets of 18 naturally infected, field-caught rabbits. They concluded that the coprophagy habit does not induce any periodicity in output of nematode ova; and therefore either type of faeces can be used satisfactorily for the estimation of the level of infection with parasitic worms.

J.M.W.

215—California Fish and Game.

- a. WALES, J. H., 1958.—“Intestinal flukes as a possible cause of mortality in wild trout.” 44 (4), 350-352.

(215a) Wales examined two cases of reported mass mortality of trout (*Salmo gairdnerii* and *Salvelinus fontinalis*) in the Lower Gumbout and Castle Lakes in Siskiyou County and found the fish intestines to be inflamed and to contain *Crepidostomum*, probably *C. farionis*, in numbers of several to up to 446 flukes per fish. He suggests that these flukes may often be the cause of mortality which is ascribed to malicious poisoning, “winterkill” or dynamiting.

G.I.P.

216—Canadian Field-Naturalist.

- a. OLIVER, D. R., 1958.—“The leeches (Hirudinea) of Saskatchewan.” 72 (4), 161-165.

(216a) Oliver lists the leeches found in Saskatchewan. Four species of them, namely, *Glossiphonia complanata*, *Helobdella stagnalis*, *Erpobdella punctata* and *Nephelopsis obscura* were found over most of the province, while two additional species, *Haemopsis grandis* and *Dina parva*, were found in the Canadian Shield region. Except for *D. dubia*, the ranges of distribution of all the species extend southward to the U.S.A. As well as the above mentioned species the following were found: *Hemiclepsis occidentalis*, *Placobdella montifera*, *P. parasitica*, *Theromyzon occidentale*, *T. rude*, *T. tessulatum*, *Cystobranchnus* sp., *Illinobdella moorei*, *Piscicola geometra*, *P. milneri*, *P. punctata*, *Haemopsis marmorata* and *Dina ferox*.

N.J.

217—Canadian Journal of Comparative Medicine and Veterinary Science.

- a. GIBBS, H. C., 1958.—“On the gross and microscopic lesions produced by the adults and larvae of *Dochmoides stenocephala* (Railliet, 1884) in the dog.” 22 (11), 382-385. [French summary p. 385.]

(217a) This is a careful description of the lesions produced by *Uncinaria stenocephala* in dogs. Three-week-old pups were infected through the skin of the groin by an (estimated)

number of infective larvae obtained by faecal culture of ova; and also orally by an (estimated) number in a gelatin capsule. The pups were killed at intervals after infection and specimens of skin, lung, stomach, duodenum and small intestine examined histologically. The conditions found are described in considerable detail and good photomicrographs show the lesions caused by both adults and larvae clearly. An important point was the small amount of haemorrhage at the point of attachment of the adults. In the lungs the larvae evoked a polymorph, i.e. an inflammatory, rather than an eosinophil reaction. Gibbs considers that the worm does not appear to be as effective a blood-sucker as *Ancylostoma caninum* and mentions especially the very marked inflammatory nature of the response to the larvae in the skin and in the lungs; this may possibly be due to secondary bacterial infection concomitant with the invasion of the larvae.

W.K.D.

218—Canadian Journal of Zoology.

- a. FAIRBAIRN, D., 1958.—“Trehalose and glucose in helminths and other invertebrates.” **36** (5), 787–795.
- b. MULVEY, R. H., 1958.—“Impregnation of *Heterodera trifolii* by males of *H. schachtii* (Nematoda: Heteroderidae).” **36** (6), 839–841.
- c. WOLFE, L. S. & PETERSON, D. G., 1958.—“A new method to estimate levels of infestations of black-fly larvae (Diptera: Simuliidae).” **36** (6), 863–867.
- d. LUBINSKY, G., 1958.—“On the 12-hooked oncospheres of Canadian strains of *Echinococcus*.” **36** (6), 883–887.
- e. MARGOLIS, L., 1958.—“A new species of *Lecithophyllum* from North Pacific fishes with a consideration of the taxonomy of the genera *Lecithophyllum*, *Aponurus*, and *Brachadena* (Trematoda: Hemiuridae).” **36** (6), 893–904.

(218a) Fairbairn determined glucose and trehalose in minced tissue extracts of 71 species of invertebrates representing the major phyla. Glucose was estimated by a specific glucose oxidase assay, and trehalose by equating total carbohydrate in chromatogram eluates with glucose formed by acid hydrolysis of the carbohydrate. The following 15 species of helminths were examined: Nematoda—*Porrocaecum decipiens* (larva), *Trichinella spiralis* (larva), *Uncinaria stenocephala*, *Trichuris ovis*, *Ascaridia galli*, *Heterakis gallinae*, *Litomosoides carinii*, *Ascaris lumbricoides* (haemolymph); Cestoda—*Hymenolepis diminuta*, *Raillietina cesticillus*, *Moniezia expansa*, *Taenia taeniaeformis*; Trematoda—*Schistosoma mansoni*, *Fasciola hepatica*; Acanthocephala—*Moniliformis dubius*. Parasitic nematodes in general were found to contain more trehalose than cestodes, trematodes and other invertebrates, with the possible exception of insects. The concentration ranged from 4% of the tissue solids in *Ascaris lumbricoides* haemolymph to 0.06% in *Litomosoides carinii*. Except in *Ascaridia galli* and *Heterakis gallinae* the glucose-trehalose ratio in the nematodes examined was considerably less than one. The four cestodes examined and *Fasciola hepatica* contained little or none of either sugar, whereas the acanthocephalan *Moniliformis dubius* contained large amounts of both. *Schistosoma mansoni* (examined by paper chromatography only) was positive for trehalose and negative for monosaccharides. The glucose-trehalose ratio was greater than one in free-living invertebrates of marine, fresh-water or terrestrial origin, most of which contained both carbohydrates. No obvious phylogenetic correlation in the distribution of carbohydrates was apparent, nor was trehalose confined to species living in particular habitats. Since chromatograms were generally stained more strongly in the glucose and trehalose positions than elsewhere it is likely that these are the predominant sugars in the tissues. Disaccharides other than trehalose, and hexoses other than glucose were not detected in appreciable amounts. There is reason to believe that trehalose may either share certain aspects of energy metabolism with glucose, or substitute successfully for it.

J.M.W.

(218b) Mulvey has succeeded in bringing about the impregnation of females of *Heterodera trifolii* (a parthenogenetic species) with sperm from *H. schachtii*. No males were produced in the several hundred offspring from several impregnated females of *H. trifolii*. Details of “fertilisation” and of subsequent egg development are not given.

J.J.H.

(218c) Wolfe & Peterson describe a new method of estimating the levels of infestation of black-fly larvae in streams. Hollow, white-painted, metal cones, 20 cm. high and 10 cm. in diameter at the base are fixed in position in the infested streams by wires attached to the apices and fastened to objects in the stream or on the bank. The larvae attach themselves to the cones in preference to stones or vegetation, permitting quantitative study of their distribution and seasonal fluctuations.

J.M.W.

(218d) Lubinsky reports on the 12-hooked oncospheres (duodecanths) of Canadian strains of *Echinococcus*. Approximately 5,000 eggs of the reindeer strain and the moose strain were used. The author indicates that supernumerary hooks are median. The 12-hooked oncospheres were almost twice the size of the 6-hooked ones; and in the reindeer strain occurred far in excess of the usual frequency of mutations. It is suggested that 12-hooked oncospheres result from duplication of structures.

N.J.

(218e) A description of *Lecithophyllum anteroporum* n.sp. from *Merluccius productus*, *Oncorhynchus nerka* and *O. gorbuscha* shows that it is closely related to *L. sphaerolecithum* but differs from this species in the position of the genital pore and in the arrangement of the vitellaria. Two tables are included giving measurements and details of the distribution of *L. anteroporum*. The status of *Lecithophyllum*, *Aponurus* and *Brachadena* is discussed. Keys are given to distinguish these genera and the species belonging to *Lecithophyllum*. *A. intermedius* is transferred to *Lecithophyllum*.

H.H.W.

219—Central African Journal of Medicine.

a. ORAM, R. H., 1958.—“Filariasis on the North Nyasa Lake shore.” 4 (3), 99–103.

(219a) Of 200 hospital patients coming from the Kyela area on the North Nyasa Lake shore, 32 (4 females and 28 males) had microfilariae of *Wuchereria bancrofti* in their blood at night; these figures are probably lower than the infection rates in the general population of the Kyela area. Microfilariae were found in the blood of 18 out of 92 patients coming from the Songwe area (to the south of Kyela) and in 10 out of 40 patients examined at a rural dispensary in the Songwe area. Microfilariae were found in the blood of 6 out of 82 patients from the Karonge area, which is south of Sarongwe and has a lower rainfall than the other two areas. Three villages in the Sarongwe area were surveyed for elephantiasis and associated conditions: hydrocele was the commonest condition; elephantiasis of the scrotum and penis and of the legs, and a condition resembling epididymo-orchitis were common; and elephantiasis of the arms and breasts and elephantoid fever with lymphangitis were seen occasionally.

W.A.F.W.

220—Ceylon Medical Journal.

- a. WIJERATNE, R. P., 1958.—“Some problems in general practice in Ceylon.” 4 (3), 187–194.
- b. D'ABRERA, V. ST. E., 1958.—“The aetiology of ‘tropical eosinophilia’, with a preliminary note on the pathology of the syndrome.” 4 (3), 195–210.
- c. WATSON, R. S. & PERERA, S. A. N., 1958.—“A study of the eosinophil count of Ceylonese and some of the factors that influence the count.” 4 (3), 243–252.

(220a) In the course of many interesting observations not applicable to helminthology, Wijeratne ranks gastro-enteritis due to bacterial infection and its associated toxæmia as the biggest problem that faces the general practitioner in Colombo. Roundworms trying to get away from the changed environment travel upwards and are expelled in the vomit or downwards to be evacuated in the faeces. This has led to the supposition that the toxæmia is caused by the worms. Consequently anthelmintics are administered, which invariably aggravate the condition, especially if purgation is inadequate. Urticarial rash, fever, and diarrhoea with colic develop—in other other words an anaphylactic condition produced by absorption of protein from dead worms. The correct treatment is to give an insoluble sulphonamide in mild cases, an antibiotic in severe cases.

J.M.W.

(220b) D'Abrera reviews the three phases—coryzal, bronchitic, asthmatic—of tropical eosinophilia. Six case histories are recorded, in one of which there was roundworm infection, while two others were infected with microfilariae. The author believes that, in India, Ceylon and Malaya, this syndrome is due to an allergic condition capable of being initiated by several parasites, the commonest being helminths; and that it differs from Loeffler's syndrome of middle latitudes only in degree, perhaps owing to the influence of climate. The therapeutic efficacy of hetrazan and of organic arsenic is evidence in favour of helminthic aetiology. Notes on the histopathology of the condition, based on cases examined post mortem in Ceylon and Singapore, are included. Granulomata present in the lungs of one of these cases were found to be due to larval forms of *Necator americanus*. J.M.W.

(220c) Erroneous impressions concerning the eosinophil count and its rise and fall have arisen, in part owing to bad technique. The differential count is of no value and should be replaced by the direct counting technique of MacFarlane *et al.* (*Brit. med. J.*, 1951, Nov. 17). A high eosinophil count is not always evident in cases of parasitic infection, including filariasis, but may be marked at certain stages of the disease. The normal range of circulating eosinophils in the blood was found to be 20–350 cells per cu.mm. in apparently normal individuals. The only reliable way of assessing rise or fall in the eosinophil count of an individual is to have a previous count obtained under normal basal conditions for comparison. J.M.W.

221—Ceylon Veterinary Journal.

- a. SHOHO, C., 1958.—“Studies of cerebro-spinal nematodiasis in Ceylon (IV). Is *Setaria labiato-papillosa* (Alessandrini, 1838) synonymous with *Setaria cervi* (Rudolphi, 1819)?” 6 (1/2), 9–14.
- b. SHOHO, C., 1958.—“Studies of cerebro-spinal nematodiasis in Ceylon (V). On the identity of *Setaria* spp. from the abdominal cavity of Ceylon spotted deer, *Axis axis ceylonensis*, Fitzinger.” 6 (1/2), 15–20.

(221a) Shoho concludes from the existing literature and from his own observations that *Setaria labiato-papillosa* and *S. cervi* are two different species. This conclusion is corroborated by the fact that the ratio of the distance between the tip of the tail and the centre of the base of the lateral appendages to the length of the lateral appendages is different in the two cases. The paper is illustrated by photomicrographs and camera lucida drawings of *Setaria* spp. of bovine and cervine origin. N.J.

(221b) Shoho describes and illustrates the parasites found in the abdominal cavity of six specimens of *Axis axis ceylonensis*. He concludes that the majority of these parasites were identical with *Setaria cervi* of Maplestone, 1931 and differed from *S. cervi* Rudolphi, 1819, in the contour of the posterior end of the female. *S. cervi* of Maplestone, 1931 is therefore renamed *S. axis* nom.nov. The taxonomic position of a single female worm which differed from the other specimens could not be determined owing to the fact that the specimen was damaged. N.J.

222—Chinese Medical Journal. Peking.

- a. CHANG, H. T., WANG, C. W., YÜ, C. F., HSÜ, C. F. & FANG, J. C., 1958.—“Paragonimiasis. A clinical study of 200 adult cases.” 77 (1), 3–9.

(222a) This is a report of 200 cases of paragonimiasis treated at Hangchow (Chekiang province, China). In 56 cases the incubation period was less than three months. Cough and rusty sputum were the earliest symptoms; pain in the chest was almost invariable; and fever occurred in about 70% of cases. 52 out of 60 examined had disturbances of vision, and 38 out of 200 subcutaneous nodules; in 15 of these excision showed adult worms in five, and worms together with ova in one. 23 of the 200 had no ova in the sputum or in the stools. Five cases with symptoms referable to the central nervous system had ova in the cerebrospinal fluid. The prognosis in cases with involvement of the central nervous system was generally poor. Skin tests with *Paragonimus* antigen were positive in 99%. No previous biopsies of subcutaneous nodules of this type have been reported from China. W.K.D.

222—Chinese Medical Journal. Peking (cont.)

- b. SHIH, Y. C., CH'EN, Y. H. & CHANG, Y. C., 1958.—“Paragonimiasis of central nervous system. Observations on 76 cases.” **77** (1), 10–19.
- c. SUN, K. Y., 1958.—“A case of *Wuchereria bancrofti* microfilaria in the anterior chamber.” **77** (1), 74–75.
- d. WEI, W. P., 1958.—“The people's boundless energy during the current leap forward. I. New victories on the antischistosomiasis front.” **77** (2), 107–110.
- e. MAO, S. P., 1958.—“The people's boundless energy during the current leap forward. II. Intensive tartar emetic treatment in schistosomiasis japonica.” **77** (2), 110–111.
- f. FENG, L. C., MA, S. F. & LIU, W. T., 1958.—“Further observations on the transmission of *Wuchereria malayi* by *A. hyrcanus* var. *sinensis*.” **77** (2), 112–120.

(222b) At the First Medical College, Shanghai, 76 proved cases of paragonimiasis of the central nervous system were examined, aged from five to 39 years, all but one being male. Cerebral lesions were found in 68, spinal lesions in five, and both types in three. The average incubation period was about ten months from the commencement of chest symptoms. The main nervous symptoms were headache, epileptic attacks, and motor disabilities. Ova were present in the sputum in all cases, X-ray with pneumoencephalography showed evidence of a space-occupying lesion in the majority of cases. Resection of the affected area was the most satisfactory treatment. In the spinal cases the lesion is usually below T.10, and the earliest symptom, paraplegia. The adult worm, and not the eggs, is considered to be responsible for the lesions.

W.K.D.

(222c) From Tsinan in Shangtung province, Sun reports the case of a 23-year-old male who complained of blurred vision, photophobia, redness of the eye and headache. The scrotum was slightly swollen but no elephantiasis and no palpable glands were present. The right eye showed trachomatous follicles and on slit-lamp examination numerous thread-like worms swimming in the anterior chamber were observed, but none in the vitreous. The left eye was normal. The blood showed 8% eosinophils and *Microfilaria bancrofti* at midnight. Paracentesis of the anterior chamber with collection and centrifugation of the aqueous showed motile microfilariae which, when stained, proved to be *Mf. bancrofti*. After treatment with hetrazan, carbasone, and sodium stibogluconate the blood became negative six weeks after admission and microfilariae disappeared from the anterior chamber after a further seven weeks.

W.K.D.

(222d) This paper gives the reader some idea of the almost incredible efforts now being put forth from the environmental hygiene point of view in China. Schistosomiasis is prevalent in 12 of the provinces, but in the spring of 1958 burial of *Oncomelania* snails was carried out over an area of more than one million sq. km. and at the same time, in one area alone, a three-day treatment of 350,000 persons by tartar emetic was given. Wei points out that the anti-schistosomiasis campaign must be closely co-ordinated with agricultural production and irrigation projects.

W.K.D.

(222e) In the first half of 1958 over one million persons with *Schistosoma japonicum* infections were treated as ambulatory cases, mainly by intensive three-day courses of tartar emetic. The total dosage of the drug was 12 mg. per kg. body-weight for two to three days. Persons weighing over 60 kg. received 0.7 gm. Contra-indications were minimal, comprising chiefly cardiac, liver, or splenic conditions. Out of 513,742 persons in four provinces treated there were only 36 deaths by this method, while of 81,511 persons given the classic 20-day course, 29 died.

W.K.D.

(222f) Investigation of *Anopheles hyrcanus* var. *sinensis* eggs in the Hangchow (Chekiang) region of China showed the existence of three different races. Two of the races were found in human dwellings and the smaller of these was anthropophilic. The breeding habits of the two races were different. In certain “hsiang” *Wuchereria malayi* infects more than 50% of the population, and 15% of dissected mosquitoes showed filarial embryos of two different stages. The small race of *A. hyrcanus* var. *sinensis* can transmit *W. malayi* better than the large race. Thus Feng & Ma's theory on the transmission of *W. malayi* by a special race of *A. hyrcanus* is confirmed. This is probably of importance in the epidemiology of malaria, which is also transmitted by this species in the lower Yangtze valley and delta.

W.K.D.

222—Chinese Medical Journal. Peking (cont.)

- g. WANG, W. L., WU, Y. Y., CHIANG, P. J. & MAO, S. P., 1958.—“Immunological studies in experimental schistosomiasis japonica.” **77** (2), 121–128.
- h. WANG, C. F., LIN, C. L. & CH'EN, W. H., 1958.—“The mechanism of microfilarial periodicity.” **77** (2), 129–135.
- i. LIU, C. S., LI, P. S., WU, C. Y. & YANG, T. C., 1958.—“The value of cercariae membrane reaction in the diagnosis of schistosomiasis japonica.” **77** (2), 136–143.
- j. KUO, P. F. & CHIANG, S. C., 1958.—“Observations on skeletal development in schistosomiasis dwarfism.” **77** (2), 144–147.
- k. CHU, S. H., 1958.—“Oxygen treatment of ascariasis in children.” **77** (2), 151–152.

(222g) Percutaneous infection of white mice and rabbits with varying quantities of *Schistosoma japonicum* cercariae from artificially infected *Oncomelania* snails was performed, the animals after varying periods were autopsied, and the worms from the mesentery and liver counted, sexed, and weighed after drying. In both types of host, worm development rates were inversely proportional to the number of exposures, but rabbits receiving a pre-disposing dose of cercariae showed less worm reduction than controls. After active immunization with either adult worms or cercariae there was no significant difference in the worm development rates between the experimental and the control animals. W.K.D.

(222h) Examination of ten patients in Foochow with bancroftian filariasis showed that periodicity is present throughout the whole vascular system but more microfilariae were found in the capillaries. The lung is the only organ where diurnal accumulation takes place and the peripheral nocturnal microfilariae come mainly from the pulmonary vessels. The larger the size of the microfilariae the greater the periodicity, and the average size in daytime is less than at night. Injection of vagus stimulants (e.g. acetylcholine) caused an increase in the number of circulating microfilariae. Climate may have some influence also on periodicity, while lower intracapillary pressure favours accumulation of microfilariae in the lung. Being living organisms, the microfilariae may choose their own favourable environmental conditions. The basic mechanism of other types of microfilarial periodicity is similar to that of the nocturnal type but can be modified by other factors. W.K.D.

(222i) The cercarial membrane reaction (CMR) was tested on 300 positive cases of *Schistosoma japonicum* infections and the results graded from negative to 3+. 47 were +, 32 ++, and 204 +++. The cercariae were affected in three main ways, namely, by the formation of an enveloping homogeneous membrane, by the formation of a granular precipitate, and by a mixed reaction. The membranous and mixed reactions were the most significant diagnostically. Readings should be made within eight to 12 hours and, if negative, again at 24 hours. Reactions were less in persons below ten and above 50 years of age but there was no difference between early and late cases. Skin tests using schistosome and *Fasciola hepatica* antigens were performed at the same time on 200 cases positive to *S. japonicum*, with rather equivocal results. The CMR is likely to be of value in mass surveys and gives fewer false positives than skin tests though *Paragonimus* infection may give a positive reaction. W.K.D.

(222j) Ten males and two females aged 18 to 30 years were investigated for dwarfism. All had had repeated infection with *Schistosoma japonicum* since childhood. Comparison with 12 normal persons of similar ages showed lesser skeletal development especially of the long bones. Many of the bony changes improved after antimony treatment and this was particularly marked in younger persons. The defective skeletal development is consistent with an underlying hypogonadism due to hypofunction of the anterior pituitary. W.K.D.

(222k) Oxygen at the rate of 30 ml. to 50 ml. per minute to a total dosage of 100 ml. to 150 ml. per year of age was given to 148 children aged one to 14 years suffering from ascariasis. When 84 were examined for ova one to two weeks later 79 were negative. The treatment does not require hospitalization but the passing of the stomach tube is unpleasant. Chu considers that oxygen is well worth a trial in *Ascaris* infections in children. W.K.D.

222—Chinese Medical Journal. Peking (cont.)

- l. GANCARZ, Z., 1958.—“Studies on schistosomiasis. I. Cercarien-Huellen-Reaktion and precipitin ring test for early diagnosis and criteria of cure in experimental schistosomiasis japonica.” **77** (3), 236–240.
- m. GANCARZ, Z., 1958.—“Studies on schistosomiasis. II. Comparative study on the activity of sodium salts of penta-, tetra- and tri-chlorophenate against *Oncomelania hupensis*.” **77** (3), 240–242.
- n. GANCARZ, Z., 1958.—“Studies on schistosomiasis. III. Resistance of *Oncomelania* snails to sodium penta-chlorophenate.” **77** (3), 242–243.
- o. TSOU, H. W. & YING, Y. Y., 1958.—“A pathologic study of intestinal schistosomiasis associated with cancer.” **77** (3), 244–253.
- p. CH'EN, K. H., WANG, S. P., YU, M. H. & LIU, T. S., 1958.—“*Gongylonema* infestation. A case report with morphologic study.” **77** (3), 254–256.

(222l) Three groups of rabbits were inoculated with different dosages of cercariae of *Schistosoma japonicum*. Following positive finding with the CHR and PRT reactions, a two-day course of intensive treatment with potassium antimony tartrate was administered. When definite negative CHR and PRT reactions occurred, the animals were reinfected and series of serological tests made. Finally most of the animals were autopsied. Both CHR and PRT reactions were positive in all experimental animals and proved to be reliable means of early diagnosis in experimental schistosomiasis. The advantage of serological procedures over stool examination was confirmed. Both CHR and PRT reactions also appeared to be reliable criteria for cure. Correlation existed between the degree of infection and the intensity of reaction in the serological tests, which increased with the course of infection from the second to fifteenth week for CHR and from the second to twenty-ninth week for PRT, decreasing thereafter. Following successful treatment, the CHR reaction became negative within 26th to 45th week and became positive again within the fourth to sixth week after reinfection. The PRT reaction became negative within the 24th to 37th week and positive again after reinfection within the fourth to tenth week. Both reactions showed a lower intensity after reinfection than after initial infection; and both might be negative in dying animals. A two-day course of intensive treatment with potassium antimony tartrate in rabbits brought about a mortality of 33.3%. All the animals which survived the treatment were definitely cured. L.S.Y.

(222n) In a series of experiments using different concentrations of molluscicides on *Oncomelania hupensis* in the laboratory, the author found that the LD₅₀ of sodium pentachlorophenate is much lower than that of the tetrachlorophenate; and that of the tetrachlorophenate slightly lower than that of the trichlorophenate. In other words, the pentachlorophenate is 2 to 4.5 times more potent than either the tetra- or trichlorophenate as a molluscicidal drug. L.S.Y.

(222n) More than 14,000 *Oncomelania hupensis* were repeatedly exposed over several months to increasing concentrations of sodium pentachlorophenate to see if the snail can develop drug resistance. There was a slight suggestion of acquired drug resistance which, if existent, must be very insignificant under the conditions of the experiments. L.S.Y.

(222o) 33 cases of intestinal schistosomiasis associated with cancer were studied. 23 were males and ten females. 70% of the lesions were located in the rectum and sigmoid colon. Together with the above cases, 179 cases of simple intestinal schistosomiasis and 162 cases of simple intestinal cancer were also studied. The incidence of intestinal schistosomiasis associated with cancer with 15.5% and that of intestinal cancer associated with schistosomiasis was 16.9%. The average age of the patients with schistosomiasis alone was 32.3 years, of the patients with intestinal cancer alone 46.3 plus or minus 1.09 years, and of the patients with intestinal schistosomiasis associated with cancer 40.4 plus or minus 1.84 years. Thus intestinal cancer associated with schistosomiasis developed earlier than cancer uncomplicated by schistosomiasis. Chronic schistosomiasis may induce mucosal ulceration, proliferation and polyp

formation, creating an environment favourable to cancer development. Hence chronic schistosomiasis is one of the promoting factors of cancerous growth. Transitional changes between proliferative mucosa and cancerous lesions were found. The cancerous growth might be of multicentric origin. The importance of careful and thorough examination of chronic schistosomal lesions was stressed. Carcinoma developing on top of chronic schistosomiasis was usually highly differentiated, metastasis occurring late and rarely. Early diagnosis and treatment of such cases are important. L.S.Y.

(222p) One male and two female worms were extracted from the inner surface of the cheek and under the tongue of a patient in China. The worms were identified as *Gongylonema pulchrum*. L.S.Y.

223—Chinese Veterinary Journal.

- a. LIN, M. C. & CHEN, F. S., 1958.—[A survey of swine helminths in Pingfei district, Anhwei Province.] Year 1958, No. 6, pp. 203–205. [In Chinese.]
- b. CHANG, Y. C., 1958.—[Experiments on the use of gamma-hexachlorobenzene for treating swine ascariasis.] Year 1958, No. 6, pp. 205–207. [In Chinese.]
- c. ANON., 1958.—[Hygromycin for treating swine ascariasis.] Year 1958, No. 6, p. 239. [In Chinese.]
- d. ANON., 1958.—[The use of lead arsenate in treating sheep infected with tapeworms.] Year 1958, No. 6, [p. 242]. [In Chinese.]
- e. ANON., 1958.—[The use of tin arsenate in treating *Avitellina* infection in sheep.] Year 1958, No. 6, [p. 242]. [In Chinese.]
- f. ANON., 1958.—[The use of sulphathiazole in treating dictyocauliasis in sheep.] Year 1958, No. 6, [p. 242]. [In Chinese.]
- g. ANON., 1958.—[Treatment of fowl ascariasis.] Year 1958, No. 7, p. 283. [In Chinese.]
- h. ANON., 1958.—[Treatment of the pig liver trematode.] Year 1958, No. 7, p. 283. [In Chinese.]
- i. CHENG, T. J. & YANG, T. K., 1958.—[Studies on the use of Chinese medicine in treating fascioliasis and paramphistomiasis.] Year 1958, No. 10, pp. 474–478. [In Chinese.]
- j. CHU, Y. S. & WANG, C. Y., 1958.—[Experiments in destroying schistosome eggs through fermentation by storage of faeces.] Year 1958, No. 11, 505–513. [In Chinese.]
- k. PAN, P. Y. & WANG, C. Y., 1958.—[Incidence and diagnosis of schistosomiasis in domestic animals in the Nine Rivers District.] Year 1958, No. 11, pp. 527–529. [In Chinese.]
- l. WANG, Y. C., 1958.—[The use of the rectal scraping method for diagnosing *Schistosoma japonicum* in domestic animals.] Year 1958, No. 11, pp. 537–538. [In Chinese.]
- m. KUNG, D. S., 1958.—[The use of santonin in treating ascariasis in cattle.] Year 1958, No. 11, p. 541. [In Chinese.]
- n. ANON., 1958.—[Experiments on the use of sodium fluoride for expelling pig ascarids.] Year 1958, No. 12, pp. 543–547. [In Chinese.]
- o. SHER, Y. J., 1958.—[A preliminary report on the immunological diagnosis for ascariasis (intradermal reaction).] Year 1958, No. 12, pp. 548–552. [In Chinese.]
- p. GONG, K. S., 1958.—[A record of swine lungworm disease.] Year 1958, No. 12, pp. 571–572. [In Chinese.]
- q. YANG, W., 1958.—[A record of swine trichuriasis.] Year 1958, No. 12, pp. 572–573. [In Chinese.]

(223a) As a result of the examination of ten pigs in Anhwei Province, the authors report the following helminths: *Cysticercus tenuicollis*, *Oesophagostomum dentatum*, *O. longicaudum*, *Metastrongylus elongatus*, *M. pudendotectus*, *Ascaris suum*, *Ascarops strongylina*, *Gnathostoma* sp., *Trichuris suis* and *Macracanthorhynchus hirudinaceus*. A brief description is given of each worm. L.S.Y.

(223b) In a series of experiments, the author finds gamma-hexachlorobenzene to be effective in treating pig ascariasis, but cannot recommend it as it is rather toxic. L.S.Y.

(223c) Hygromycin is made from *Streptomyces hygroscopicus*. It is found to be very effective in treating swine ascariasis by adding 12 million units to a ton of food. L.S.Y.

(223d) Lead arsenate is effective in the total expulsion from sheep of *Moniezia expansa*, *M. benedeni*, *Stilesia globipunctata* and *Avitellina centripunctata*. It should not be used on sick sheep or pregnant ewes. L.S.Y.

(223e) Oral administration of tin arsenate is found to be very effective in treating avitellinosis in sheep. L.S.Y.

(223f) 5% sulphathiazole administered by intratracheal injection, in dosages varying according to age, was found to be 85% effective in treating dictyocauliasis in sheep. L.S.Y.

(223g) Carbon tetrachloride and piperazine adipate are recommended for the treatment of roundworm infection in poultry. The former is 100% effective and the latter 94%. L.S.Y.

(223h) Subcutaneous injection of carbon tetrachloride is found to be highly effective and specific in the treatment of pig liver trematode [*Clonorchis sinensis*] infections; and rather ineffective against the other helminths. L.S.Y.

(223i) The authors report on a series of experiments using Chinese herbal medicine, composed essentially of *Dryopteris crassirhizoma* Nakai L. (Polypodiaceae), as an anthelmintic. The chemical composition of this preparation needs further study. It was found effective in treating both *Fasciola hepatica* and *Paramphistomum explanatum*, both of which occurred in the bile-duct in 80% of cattle examined. L.S.Y.

(223j) Cattle faeces, when slightly dried before dump storing, should ferment and reach a maximum temperature of 65°C. to 71°C. Exposure to a temperature of 42°C. for a reasonably long time is sufficient to kill schistosome eggs. L.S.Y.

(223k) *Schistosoma japonicum* is common in domestic animals in Kiangsi province. In the survey, five diagnostic methods were tried, and the authors report the rectal scraping method to be most effective. L.S.Y.

(223l) In examining 175 head of cattle for *Schistosoma japonicum*, the author found 19 (10.86%) were positive by the rectal scraping method, while only five (2.9%) were positive by the egg hatching method. The author recommends the former as the easier and more effective diagnostic method. L.S.Y.

(223m) By oral administration of santonin followed by sodium sulphate purgation and injection of naphthalene sodium sulphonate, the author obtained 100% removal of ascarids in cattle. L.S.Y.

(223n) Previous reports on the effectiveness of sodium fluoride are verified. It was found to be 95.7% to 100% (average 97.5%) effective in expelling *Ascaris* from pigs, and is considered to be cheap, effective and suitable for Chinese conditions. L.S.Y.

(223o) Intradermal tests by injection of small quantities of antigen into the dorsal surface of the ear revealed 86% of pigs as positive for *Ascaris* infection, compared with 65% revealed as positive by faecal examination. Some pigs have multiple helminth infections and further work is needed to test the specificity of this test. L.S.Y.

(223p) *Metastrongylus* sp. is recorded in pigs in Honan province. L.S.Y.

(223q) The author records an outbreak of *Trichuris trichiura* infection in pigs. L.S.Y.

224—Comptes Rendus des Séances de l'Académie des Sciences. Paris.

- a. FAVARD, P., 1958.—“L'origine ergastoplasmique des granules protéiques dans les spermatoocytes d'*Ascaris*.” **247** (4), 531-533.
- b. TIMON-DAVID, J., 1958.—“Le développement expérimental d'un trématode du genre *Opisthioglyphe* Looss (Digenea, Plagiiorchiidae), par des gammarès.” **247** (17), 1416-1418.

(224a) Favard has studied, by means of the electron microscope, the origin of the protein granules in *Parascaris equorum*. Young primary spermatocytes show in the cytoplasm filamentous mitochondria, ergastoplasmic bands and lipid inclusions (neutral glyceride). At the beginning of prophase the lipid inclusions become surrounded by pairs of ergastoplasmic bands with “grains de Palade” which form concentric rings, becoming more and

more numerous. At the end of development about a dozen pairs of bands are present. During this the lipid inclusion disappears and is replaced by cytoplasm rich in "grains de Palade"; at the middle of this central cytoplasmic mass a small homogeneous osmiophilic granule forms with a distinct border. Biochemical tests have shown this to be ascaridine. As this granule grows in size the ergastoplasm diminishes, disappearing entirely by the time it attains a diameter of 1μ . During spermatogenesis the protein granules break up into tiny grains. S.W.

(224b) Timon-David describes a metacercaria of *Opisthioglyphe* found parasitizing *Gammarus pulex* in a small river on the coast of Bouches-du-Rhône; in some places the infection rate reached 100%. The morphology agrees closely with that of the metacercaria of *O. megastomus*, which is also found in *Gammarus*. Experimental infection of ducklings and pigeons was consistently unsuccessful but cats became infected. Development was very rapid, eggs being present in the uterus 72 hours after exposure. The characters of the adult form in the cat also agree closely with those of *O. megastomus* (a parasite of *Neomys fodiens*) except that they are very much larger. Timon-David therefore proposes the name *O. megastomus forma major*. S.W.

225—Comptes Rendus des Séances de la Société de Biologie. Paris.

- a. ROMAN, E. & DOUCHET, C., 1958.—"Migrations dans l'appareil respiratoire du rat du nématode *Strongyloides ratti*; possibilités de passage dans les poumons de la souris de *Str. stercoralis* de l'homme." **152** (11), 1515-1517.
- b. TIMON-DAVID, J. & REBECQ, J., 1958.—"Les métacercaires parasites de l'annélide *Nereis diversicolor* O. F. Müller et leur développement expérimental." **152** (12), 1731-1733.

(225a) This paper is a report of the migration of *Strongyloides ratti* through the lungs of the rat and *Strongyloides stercoralis* through the lungs of the mouse. The work with the former has shown that 48-60 hours after skin penetration the larvae have passed through the lungs and are to be found starting to penetrate the mucosa of the small intestine. Following these observations mice were infected with the parasite of man *Strongyloides stercoralis*. Mice which were given 2,400 infective larvae had a small number of immature worms in the lungs after 24-27 hours. Some of the same immature worms were also found in the stomach contents. In mice which had received a heavier infection of 4,700-5,000 larvae no immature forms were found. K.H.

(225b) Timon-David & Rebecq record three species of metacercariae in *Nereis diversicolor*. The first is identified as *Deropristis inflata* and the second as a species of *Gymnophallus*. The third, an echinostome, is dealt with in greater detail. Successful infections were established experimentally in *Larus argentatus michaelis* although not in pigeons and ducks. Worms recovered from the gulls five days after the infective feed already had eggs in the uterus and are identified as *Himasthla militaris*. S.W.

226—Current Science. Bangalore.

- a. AGARWAL, S. C., 1958.—"A new species of the genus *Pallisentis* (Acanthocephala)." [Correspondence.] **27** (3), 107.
- b. PUSHKARNATH & CHOUDHARY, B. N. R., 1958.—"Root-knot nematodes on potatoes in India." [Correspondence.] **27** (6), 214-215.
- c. AGARWAL, S. C., 1958.—"On a new species of *Procamallanus* Baylis, 1923 (Nematoda)." [Correspondence.] **27** (9), 348-349.
- d. NAMBUDIRI, P. N. & VIJAYAKRISHNAN, K. P., 1958.—"Neurosecretory cells of the brain of the leech *Hirudinaria granulosa* (Sav.)." [Correspondence.] **27** (9), 350-351.
- e. JAIN, S. L., 1958.—"Head organ patterns observed in some Indian fresh-water dactylogyrids; Trematoda—Monogenea." [Correspondence.] **27** (11), 449-450.
- f. RAI, J. & SRIVASTAVA, J. S., 1958.—"Preliminary list of helminth parasites of donkey (*Equus asinus*)." [Correspondence.] **27** (11), 456-457.

(226a) Agarwal describes *Pallisentis allahabadii* n.sp. from the alimentary canal and body-cavity of *Ophicephalus punctatus* (Bloch) from Allahabad giving measurements and the main characteristics of the holotype and the paratypes. [No illustration is given.] He states

that the important characters of the new species are the 15 to 18 circles of collar spines with 20 to 25 spines each in the female and 8 to 12 each in the male. The body spines of the male number 21 to 25 circles of one to 12 spines each and in the female 32 to 36 circles of one to 18 spines each, the number of body spines in each circle gradually decreasing posteriorly. The lemnisci are unequal and the female is larger than the male. He considers that the new species differs from *P. umbellatus*, *P. nagpurensis*, *P. nandai* and *P. colisai* chiefly in the characters of the collar and body spines, the proboscis hooks and in the sizes of the body, proboscis, proboscis sheath, lemnisci, testes, prostate gland, prostatic reservoir, seminal vesicle and bursa.

I.C.W.

(226b) A survey of the potato-growing regions of India showed the presence of *Meloidogyne javanica*, *M. incognita* and *M. incognita acrita*. A number of hosts attacked by species on the plains are mentioned and an experiment reported showing that *Coleus perviflorus* acts as a wild collateral host of *M. incognita*. This is a first record as are *Achyranthes aspera* and *Physalis minima* for *Meloidogyne* spp.

J.B.G.

(226c) Agarwal describes, with a figure of the male tail, a new species of nematode, *Procamallanus spiculogubernaculus*, from *Heteropneustes fossilis* (Day) obtained from the local market at [?] Allahabad, India. The right spicule is described as incompletely fused with the gubernaculum, there are seven pairs of caudal papillae on the male tail, no caudal or cervical alae and the buccal capsule is elongate, smooth and undivided with three lip-like protuberances. The species is easily distinguished from all others in the genus by the fusion of the right, smaller spicule with the gubernaculum.

W.G.I.

(226d) Nambudiri & Vijayakrishnan describe two new types of neuro-secretory cells from the cerebral ganglia of the Indian cattle leech, *Hirudinaria granulosa*—a large type characterized by numerous vacuoles in the cytoplasm and scattered clumps of colloids staining blue with Gomori's chrome alum-haematoxylin-phloxine, and a smaller type, lacking vacuoles but uniformly filled with blue granules and axonic pathways. They suggest a possible release of neurosecretory colloids into the haemocoelic fluid of the ventral channel investing the nerve ring.

J.M.W.

(226e) Jain divides the types of head organs which he encountered in his study of some Indian dactylogyrids into two main groups: A—in which the organs do not communicate with each other, and B—in which there are ducts joining the organs on either side. Group A can be further subdivided into (i) disorganized small rounded glands (perhaps the most primitive), (ii) one compact organ on either side formed as if by fusion of glands, (iii) lobate glands and (iv) specialized lobes, each with a rounded distal and conical proximal end. Group B can be divided into (i) primitive small rounded glands, (ii) swollen sac-like glands, (iii) double lobules formed by division of a main lobule and (iv) triple division of the main lobule. This is possibly the most specialized pattern and occurs in *Bifurcohaptor giganticus*, the largest known fresh-water tetraonchid. Illustrations and examples are given for each type.

G.I.P.

(226f) As a result of examining three donkeys, Rai & Srivastava record the following species for the first time from this host in India: *Pseudodiscus collinsi*, *Anoplocephala mamillana*, *Oxyuris equi*, *Strongylus (Delafondia) vulgaris*, *Triodontophorus serratus*, *T. brevicauda*, *T. minor*, *Trichonema longibursatum*, *T. calicatum*, *T. (Cylicostomum) aegyptiacum*, *T. (Cylicocylus) insigni*, *T. (Cylicocercus) pateratum*, *T. (C.) goldi*, *Trichostrongylus axei*, *Dictyocaulus arnfieldi*, *Habronema muscae*, *H. microstoma*, *H. megastoma*, *Gongylonema pulchrum* and *Setaria equina*.

J.M.W.

227—Deutsche Tierärztliche Wochenschrift.

- a. SÖRRESENSEN, H. J., 1958.—“Verbreitung und Bedeutung der Darmparasiten der Hühner im Regierungsbezirk Arnsberg.” 65 (24), 675–676. [English summary p. 676.]

(227a) Sörrensen reports on a survey of the intestinal parasites of domestic fowls carried out in the Arnsberg district of Westphalia during 1950 to 1957. A total of 5,733 birds was studied. Cause of death was considered to be helminth infection in 655 birds and coccidia

infection in 215. Helminth infections in all birds were: *Ascaridia galli*, 964; *Heterakis gallinae*, 842; *Capillaria* sp., 1,494; *Trichostrongylus tenuis*, 45; *Acuaria hamulosa*, 16; tapeworms (95% *Davainea proglottina*, 5% *Railletina* sp.), 1,588. Mixed infections were found in 1,247 birds, and 291 had helminths plus coccidia. Over the whole period the number of birds lost from these infections has decreased while the percentage of infected birds remains constant.

A.E.F.

228—Dissertation Abstracts.

- a. COX, D. D., 1958.—“Subclinical parasitism in Wisconsin dairy cattle.” **18** (3), 1156.
- b. TAYLOR, C. R., 1958.—“A study of the method of reproduction occurring in the redia of *Proterometra macrostoma* Horsfall (1933).” **18** (3), 1167.
- c. BANKS, W. M., 1958.—“The life history of *Leptophyllum ovalis* Byrd and Roudabush, 1939 (Trematoda), with remarks on its taxonomic affinities.” **18** (4), 1536.
- d. MATHIES, Jr., A. W., 1958.—“Certain aspects of the host-parasite relationship of *Aspiculuris tetraptera*, a mouse pinworm.” **18** (4), 1544–1545.
- e. McCRAW, B. M., 1958.—“Studies on the anatomy, ecology and growth of *Lymnaea humilis* (Say).” **18** (4), 1545–1546.
- f. RACE, S. R., 1958.—“Some laboratory observations on the biology and host preferences of the meadow nematodes, *Pratylenchus penetrans* and *Pratylenchus vulnus*. ” **19** (2), 205.
- g. THOMAS, H. A., 1958.—“A study of the biology and economic importance of a parasitic nematode, *Criconeimoides xenoplax* Raski, on peaches in New Jersey.” **19** (2), 206–207.
- h. KNAPP, S. E., 1958.—“An anthelmintic study of carbon disulfide and sulfur-35-labeled carbon disulfide on *Ascaridia galli* and its host.” **19** (2), 393–394.

(228a) Using a sugar flotation technique, Cox examined the faeces of Wisconsin dairy cattle in each county of the State and found subclinical parasitism to be present in 100% of all herds investigated. 75%–90% of animals under two years of age were infected with roundworms. Low-level phenothiazine treatment failed to reduce faecal egg counts of treated animals below those of the controls. Digestion of feed was not significantly different in the two groups; and weight gain observations gave inconsistent results. Milk production, however, was higher in non-treated animals; and this increase was not explicable on the basis of dam production records or male parentage. The author concludes that production inhibition may be a useful criterion of economic loss due to parasites.

J.M.W.

(228b) Morphological examination of the cells of the redia and cercaria of *Proterometra macrostoma* indicated that, whereas the cercaria is bisexual, the redia is not a sexual generation. Neither maturation figures nor polar bodies were observed in any of the cells of the redia; but gametogenesis was observed in the gonads of the cercaria. Histochemical staining and cytophotometric measurements of the desoxyribonucleic acid content of the nuclei of the cells (using the method of Patau, 1952) confirmed that the redia exhibited no evidence of sexuality.

J.M.W.

(228c) Banks found experimentally that *Leptophyllum ovalis* developed to sexual maturity in the rectum of the snake *Natrix sipedon*, a new definitive host. The intra-molluscan generations—miracidium, mother and daughter rediae—developed in the snail *Goniobasis livescens*. Laboratory-infected snails shed cercariae 21 days after ingestion of eggs. The cercariae encysted experimentally in muscle tissue of fish of the genus *Perca*, and less readily in tadpoles. The definitive host became infected by ingesting muscle containing encysted cercariae. This is the first account of the life-history of a species of this genus. It is stated that in the original dissertation (i) available information relating to the life-histories of megalurous cercariae is summarized; (ii) the relationships of the genus *Leptophyllum* to the families Echinostomatidae and Plagiorchiidae are discussed; (iii) the erection of a new family, Leptophyllidae, is proposed for the reception of the genus *Leptophyllum*.

J.M.W.

(228d) Mathies found that *Mus musculus* was a much more satisfactory host for *Aspiculuris tetraptera* than *Rattus norvegicus* or *Meriones unguiculatus*; and that *Peromyscus maniculatus* was completely refractory. He was able to demonstrate experimentally that age resistance to infection with *A. tetraptera* developed in mice, and that male mice were

more susceptible to infection than female mice. Gonadectomy resulted in a significant lowering of the worm-burden in both sexes. Oestradiol in male mice was detrimental to the establishment of a heavy infection, but testosterone had little or no effect. Total body X-irradiation of the host resulted in significantly higher worm burden.

J.M.W.

(228f) Using a laboratory technique which is stressed [but not described in the abstract] Race determined that tomato, lettuce, peach, broccoli and chrysanthemum were excellent hosts of *Pratylenchus penetrans*; that red clover, common vetch, strawberry, carrot, maize and *Crotalaria spectabilis* were good hosts; that turnip and radish were fair hosts; and that asparagus was a very poor host. The worms fed on the parenchyma cells of the root tips and caused characteristic lesions. In good or excellent hosts an infestation of 50 to 100 worms per seedling was capable of retarding root growth. Results obtained in laboratory experiments concerning degree of infestation and host attractiveness agreed with those obtained in field studies. Whereas *P. pratensis* was attracted only to the maturer regions of the root, *P. penetrans* was attracted to the root-tips as well. It was also determined that 500 *Meloidogyne hapla* larvae are capable of killing a tomato plant within three weeks of inoculation by damaging the root-tips.

J.M.W.

(228g) *Xiphinema* spp. and *Pratylenchus* spp. were found to be more abundant and more commonly associated with the roots of peach trees than *Criconeimoides xenoplax*. *Pratylenchus* spp. were also more injurious to this host. *C. xenoplax* was extracted from soil by a modification of the Baermann technique and studied microscopically on the roots of peach seedlings planted in Petri dishes. It proved to be entirely ectoparasitic and produced no lesions on the peach roots. Although egg deposition was observed, no males of *C. xenoplax* were found.

J.M.W.

(228h) Knapp found that 0.35 ml. of sulphur-35-labelled carbon disulphide was the most effective dosage for removal of adult *Ascaridia galli* from chickens, but that it was not effective against the larval stages of the parasite. The drug was more efficacious and less toxic in fasting birds. *In vitro* tests showed that carbon disulphide was taken up through the cuticle of the worm; that inactivation-time was proportional to size-index (weight divided by length); and that the greatest concentration of S³⁵ was in the body fluid of the worms. S³⁵ was found in 22 tissues and organs of the host in addition to the faeces.

J.M.W.

229—Dokladi Akademii Nauk SSSR.

- a. BOGOYAVLENSKI, Y. K., 1958.—[On the fine structure of the cuticle of *Ascaridia galli* Schrank 1788.] 120 (5), 1119–1121. [In Russian.]
- b. SPASSKAYA, L. P., 1958.—[The geographical correlations between the distribution area of the species and the zone of infection by cestodes in migratory birds.] 121 (1), 190–192. [In Russian.]

(229a) By means of the electron microscope as well as the usual methods of staining, Bogoyavlenski was able to recognize the following eight layers in the cuticle of *Ascaridia galli*: the external cortex (0.7–1.0 μ) composed of transverse rings, the internal cortex (1.0–1.5 μ), a membranous layer (seen under the electron microscope), the fibril layer (1.5 μ), the matrix (2.5–3.0 μ) clearly showing the ducts described by Toldt (1904, 1905, 1914), the external (1.0–1.5 μ) and internal (1.5–2.0 μ) fibre layers and the basal membrane.

G.I.P.

(229b) Using the collection of 47 cestodes, mainly from migratory birds which were caught during nesting in Komi A.S.S.R. and most of which overwinter in southern Russia, southern Europe or Africa, Spasskaya gives examples of those cestodes for which the distribution area coincides with the zone of infection [for abstract see Helm. Abs., 23, No. 922w], and of those for which this zone is smaller than, and restricted to, the northern part of the area of distribution. The delimitation of the zone of infection, which is not absolute but may be dependent on seasons, type of locality and distribution of hosts, is important in the determination of the centres of infection in domestic animals.

G.I.P.

230—East African Medical Journal.

- a. NELSON, G. S., 1958.—“*Schistosoma mansoni* infection in the West Nile district of Uganda. Part I. The incidence of *S. mansoni* infection.” **35** (6), 311–319.
- b. NELSON, G. S., 1958.—“*Schistosoma mansoni* infection in the West Nile district of Uganda. Part II. The distribution of *S. mansoni* with a note on the probable vectors.” **35** (7), 335–344.
- c. NELSON, G. S. & GROUNDS, J. G., 1958.—“Onchocerciasis at Koderia eleven years after the eradication of the vector.” **35** (7), 365–368.
- d. GORDON, R. M., 1958.—“The reaction to arthropod bites and its relation to arthropod-borne infections, with special reference to filariasis.” **35** (8), 393–400.
- e. MANSON-BAHR, P. E. C., 1958.—“The clinical features, diagnosis, and host parasite relationship of schistosomiasis in East Africa.” **35** (8), 401–409. [Discussion pp. 409–411.]

(230a) This is the first of four reports on various aspects of infection by *Schistosoma mansoni* in the West Nile region of Uganda. More than ten thousand persons, all over five years of age, were examined by faecal smear and spleen examination. Although admittedly this method seriously underestimates the actual incidence, it was found that about 31% of the total population of over 300,000 persons were infected. Examination of 320 children under three years old showed only two infected. Infection with *S. haematobium* does not occur and 2,000 urines from schoolchildren were negative. W.K.D.

(230b) The second paper in Nelson's series deals with a topographical and vector survey of the West Nile area and an incidence survey in which children under five years old were again excluded. *Schistosoma mansoni* is most prevalent on the Nile banks including the Lake Albert shore, where in parts the incidence is almost 80%. The vectors are *Biomphalaria* spp., some of which are efficient vectors in one area and not in another. This applies especially to the Southern Highlands (over 5,000 feet) where, although the snails are present, infection does not occur. It is pointed out that efficient antimalarial measures will also help snail control. The danger of employing infected persons on water conservation and irrigation projects is emphasized. W.K.D.

(230c) At Koderia, the onchocerciasis vector *Simulium neavei* was eradicated in 1947, but seven years later 50% of the adults were still affected. Investigation in 1958 of 311 persons by skin snips showed that 40% of adults were still suffering from onchocerciasis. In many the disease was progressive and a number showed advanced eye disease. No children born after 1946 were found infected. W.K.D.

(230d) Gordon discusses (i) the offensive/defensive types of arthropod bites, (ii) the parasitic type where the bite is adapted to the obtaining of a blood meal and (iii) the association between the reaction of the vertebrate host and the risk of acquiring the infection conveyed by the arthropod vector. He points out that in addition to blood all sanguivorous arthropods also take up fluids in which, for example, microfilariae may be present. The arthropods may show selectivity for man as against animals, and for a particular race or age group. Trauma from bites is negligible except for tsetse flies, though individuals show sensitivity to some bites and not to others. In some instances the association between the reaction of the host and the establishment of an infection is clear and distinct, but it is definite that each cyclically transmitted parasite, whether protozoon or helminth, which invades a vertebrate host finds itself in an environment which is dependent on the manner of feeding adopted by the vector, whether it causes a reaction in the host and, if so, the nature and extent of the reaction. W.K.D.

(230e) Manson-Bahr points out that the clinical features of schistosomiasis vary according to location, the extent and intensity of infection, and the immunity of the population. In the diagnosis of *Schistosoma haematobium* a single urine specimen gives only 39% positives, whereas five specimens give 80%. If the presence of red blood corpuscles in the urinary deposit is accepted as evidence of infection 70% of cases can be diagnosed from a single urine specimen. Rectal snips give a higher percentage of positives than stool examination and *S. haematobium* ova are more usually found in rectal tissue than *S. mansoni*. In Rhodesia, Africans show high immunity to *S. haematobium*, while in Egypt immunity has broken down and severe and

230—East African Medical Journal (cont.)

- f. WYDELL, S. H., 1958.—“Some abdominal complications of *S. mansoni* as seen on Ukerewe Island.” **35** (8), 413-426.
- g. TEESDALE, C. & NELSON, G. S., 1958.—“Recent work on schistosomes and snails in Kenya.” **35** (8), 427-436. [Discussion pp. 436-438.]
- h. STANDEN, O. D., 1958.—“An experimental approach to the chemotherapy of helminthiasis.” **35** (8), 439-445.

intense infections are seen. In East Africa the incidence of *S. mansoni* infections is nowhere more than 50% and may possibly be of recent introduction; eosinophilia is very common. There may be pulmonary manifestations in both *S. haematobium* and *S. mansoni* which can be either transient pulmonary infiltration, or granulomata in the pulmonary arteries and cor pulmonale associated with intense infection. *S. haematobium* is most extensive in the coastal areas. Immunity is high, though infection is intense. Eosinophilia is as common as in *S. mansoni* infection. Cystoscopy and sigmoidoscopy with rectal snips are essential for diagnosis. Unlike *S. haematobium* on the coast *S. mansoni* is nowhere hyperendemic except possibly in the West Nile district of Uganda.

W.K.D.

(230f) During work at Mwanza hospital in 1956 several cases of abdominal tumour in Africans were found to be *Schistosoma mansoni* granulomata. They formed a recognizable syndrome. The patients were not local inhabitants but came from Ukerewe Island which is in the highly endemic area to the south-east of Lake Victoria. Some cases showed severe symptoms with intestinal obstruction; though a milder type with abdominal distension was especially common in children, with enlargement of the liver and spleen. The lesions were multiple granulomata on the ante-mesenteric edge of the small intestine mainly at the lower end of the ileum. A proportion of the severe cases end fatally. Treatment is by intravenous tartar emetic, stibophen, or triostam, daily in the usual dosages. The last-named drug is the least toxic for children. The possible mechanism of production of these granulomata is discussed and also the host-parasite relationship. For most of the year infected snails are difficult to find at Ukerewe.

W.K.D.

(230g) In Kenya, using golden hamsters as the laboratory animals, snails were proven infected with *Schistosoma haematobium*, *S. mansoni*, *S. bovis*, *S. leiperi* and possibly also *S. capense*. These snails came from four main areas, namely, the coast, a township in a native reserve, near Makuyu in the European settled area (coffee and sisal estates), and near Kisumu on Lake Victoria. Cercariae shed by *Physopsis africanus ovoideus* were frequently found to be *S. bovis*. Hamsters infected by a mixed infection of *S. bovis* and *S. haematobium* showed predominance of the former which prevented the development of *S. haematobium*. On epidemiological grounds *Bulinus forskali* seems to play some part in the transmission of *S. haematobium*. For *S. mansoni*, *Biomphalaria pfeifferi nairobiensis* seems to be a natural vector and at Makuyu a rodent of *Dasymys* sp. was found infected with a *mansoni*-like schistosome, and may be a possible natural animal reservoir. Proved snail hosts are: (i) *Bulinus (Physopsis) africanus ovoideus* (*S. haematobium* and *S. bovis* in all areas except the coastal strip), (ii) *Bulinus forskali* (*S. bovis* and possibly *S. haematobium* in the Kisumu area), (iii) *Biomphalaria pfeifferi nairobiensis* (*S. mansoni* in all areas where found). Under artificial conditions *B. pfeifferi rupellii* proved a good intermediate host. There was a progressive increase in the infection rates of *Biomphalaria* and *Bulinus africanus ovoideus* during the periods when the habitat was not disturbed by heavy rain. *Biomphalaria pfeifferi nairobiensis* was found in the Nairobi river to be infected with *S. mansoni* though this schistosome is absent from the coastal area. The identity of the intermediate host of *S. haematobium* in the coastal area is not yet certain.

W.K.D.

(230h) Standen, discussing both the selective and empirical approaches to chemotherapeutic activity, illustrated his remarks by the development of lucanthone, and by the trivalent antimony compounds, pointing out that triostam (trivalent sodium antimony gluconate) is less toxic and the course of treatment shorter than with other antimony compounds. Anthelmintic tests are limited and the ideal schistosomicide has yet to be found. However, recent

230—East African Medical Journal (cont.)

- i. MELLO, J. P. DE, 1958.—“Ascariasis in general practice.” **35** (8), 447-455. [Discussion pp. 455-456.]
- j. WOODMAN, H. M., 1958.—“Filariasis with special reference to *Loa loa* and *Onchocerca volvulus*.” **35** (8), 457-465. [Discussion pp. 465-466.]
- k. JORDAN, P., 1958.—“An attempt to eradicate bancroftian filariasis on Ukara Island.” **35** (8), 467-473. [Discussion pp. 473-474.]

work on certain quaternary ammonium compounds has shown them to be effective against a wide range of intestinal nematodes in five or six different hosts. The bephenium group—bromide, hydroxynaphthoate and embonate—are especially effective against those worms which lie closely applied to the mucosa. Bephenium embonate has proved effective against *Nematodirus* in lambs, which is notorious for its resistance to all anthelmintics hitherto. Emphasis is laid on the complementary nature of experimental chemotherapy and fundamental research, and the need for adequate financial support is stressed. W.K.D.

(230i) Mello gives a description of the species of ascarids found in man, pigs and horses. Morphologically man and pig *Ascaris* are alike but physiologically they are distinct; and do not change hosts. A detailed description of the life-history is given and stress laid on the resistance of the embryonated eggs to unfavourable environmental conditions. Mature eggs containing larvae can remain infective for years. The pulmonary symptoms are mentioned and also nutritional disturbances including a Kwashiorkor-like syndrome in children due possibly to the worms feeding on the diet protein. Piperazine as adipate, citrate or hydrate is effective and safe, but rather expensive for mass treatment. W.K.D.

(230j) Woodman mentions that loaiaasis is not known in East Africa and stresses the differences between the West and Central African forms in the development of the embryo and in the host-vector relationship. Comparison of the *Chrysops* vector in West Africa with that in the Sudan would lead one to expect that the incidence would be low in the latter area, whereas actually it is high. Diurnal periodicity is not constant. He suggests that in the Sudan a tabanid fly, possibly a species of *Haematopota* or *Hippocentrum*, may prove to be the vector. Although both *Simulium damnosum* and *S. neavei* are vectors of onchocerciasis, the former is more widely spread and difficult to deal with. In East Africa new breeding areas are still being found. In Kenya *S. damnosum* is of less consequence than *S. neavei*. The prime need of prevention is emphasized though eradication is all but impossible. Repellents, for example, diethyl toluamide (DET) may be effective for several hours. Various otherwise suitable chemical compounds are toxic for fish but gammexane powder as 3% w/w gamma-isomer of BHC at 10 lb. per acre for three weeks is effective for the destruction of black fly larvae and non-toxic to fish. W.K.D.

(230k) Jordan describes an attempt to eradicate bancroftian filariasis on Ukara, an Island in Lake Victoria. He points out that in the Tanganyika section the importance and prevalence of the disease is not properly appreciated although in Mwanza 10% of all surgical operations are for scrotal conditions, mostly of filarial origin. The population of the island is about 17,000, and approximately 4,000 were involved in the eradication scheme in three areas. All inhabitants were given: in area 1—diethylcarbamazine 200 mg. per month; in area 2—the same dose every other month; in area 3—100 mg. per month. Treatment was given irrespective of whether microfilariae were present or not, and night blood was taken from as many persons as possible. At the end of 12 months blood was again taken from those initially positive. Area 3 showed the worst results hence this dosage is probably too low where the microfilarial density is as high as in that area. In one area vector studies in 1951-53 showed that *Anopheles gambiae* and *A. funestus* were the main vectors. The incidence of infective larvae per mosquito is low but the number of bites per person per night is high. Jordan speculates on the possibility of using compounds of heavy metals in treatment, for example stovarsol, with the diethylcarbamazine as the combined action may be more effective on the female worm than either drug alone. W.K.D.

230—East African Medical Journal (cont.)

- l. BARNLEY, G. R. & PRENTICE, M. A., 1958.—“*Simulium neavei* in Uganda.” **35** (8), 475–483. [Discussion pp. 483–485.]
- m. GROUNDS, J. G., 1958.—“The treatment of onchocerciasis with suramin (Antrypol) after vector eradication.” **35** (8), 487–491. [Discussion p. 492.]
- n. BUCKLEY, J. J. C., 1958.—“Occult filarial infections of animal origin as a cause of tropical pulmonary eosinophilia.” **35** (8), 493–500. [Discussion p. 500.]

(230l) The authors point out that there is now no area of Uganda drained by free-flowing perennial streams where onchocerciasis and its *Simulium* vectors cannot be demonstrated, though such areas are nearly always in or close to permanent rain forest. Infestation rates of *Potamon niloticus* and *P. granviki*, especially the former, in dense forest shade are very high; and there seems to be a correlation between crab density and infestation rate. In an attempted eradication area, it was observed that certain predatory Coenosiniinae (Muscidae) attacked the female *S. neavei* as soon as their mouth parts were engaged in the skin of the human bait and caused a marked decline in the number of black flies caught; hence these predators may exercise some biological control. Barnley & Prentice have tried a D.D.T. water-miscible concentrate at the rate of 1 p.p.m. for 30 minutes at 10-day intervals in certain streams. In discussion Barnley stated that an oily solution of D.D.T. in a 50:60 Dieseline and Power kerosene mixture was cheap and effective in rapid rivers at a concentration of 0.2 p.p.m. Subsequently Barnley & Prentice have reported that the crabs considered as *Potamon granviki* are really the closely allied *P. beradi beradi*.
W.K.D.

(230m) In 1946 Garnham & MacMahon eradicated *Simulium neavei* in the Kodera valley of South Nyanza and it has not recurred; but an onchocerciasis survey in 1956–57 showed a large number of the population still suffering from active disease. The population of the district is 600,000. 102 persons were treated with suramin. 90 of them were in the 41–70 age group, and 67 were followed up six months later. Treatment was intended to be 1 gm. of a 10% solution weekly by the intravenous route to a total of 6 gm., but for various reasons many patients received lesser amounts and the course lasted longer. For the original diagnosis, and also follow-up, skin snips were taken from four sites. Unless all were negative the patient was not considered cured. All the patients had advanced skin changes. Toxic reactions of various kinds occurred. Pain was the most prominent, but pruritus and exfoliative dermatitis occurred in 11 and 7 patients respectively, while 36 out of 52 had albuminuria. No deaths took place but the results showed clearly that a dosage of not less than 6 gm. is the minimum necessary. In view of the need for controlling toxic manifestations it is not yet advisable that such treatment be given by subordinate staff in the field.
W.K.D.

(230n) Buckley discusses tropical pulmonary eosinophilia. He first gives a history of the evidence leading to the convincing results obtained by Danaraj which strongly suggest that at least in some parts of the tropics this syndrome is caused by filarial infection. He then mentions a volunteer who received first, infective larvae of *Wuchereria* sp. (?*malayi*), and later, infective larvae of *W. pahangi* from a domestic cat. Signs and symptoms of tropical pulmonary eosinophilia occurred 14 and 10 weeks respectively after each inoculation. Diethyl-carbamazine was effective in treatment. Buckley states that there is an evident latent period after inoculation which approximates to the pre-patent periods seen by Edeson & Wharton in the experimental transmission of *W. malayi* from man to cats. Gland biopsies which might have confirmed the so-called “Myers-Kouwenaar” syndrome were not carried out on the volunteer. Buckley suggests that, either after the larvae grow to sexual maturity a substance capable of producing an allergic response in the lungs with eosinophilia is liberated or, alternatively, that the microfilariae themselves are the cause of the syndrome though they never pass from the lymphatic to the circulatory system.
W.K.D.

230—East African Medical Journal (cont.)

- o. HOLMES, E. G., 1958.—“Some considerations of the effects of helminthic parasites on man.” **35** (8), 501–505. [Discussion pp. 505–507.]
- p. NELSON, G. S., 1958.—“*Schistosoma mansoni* infection in the West Nile district of Uganda. Part III. The spleen and *S. mansoni* infection.” **35** (9), 543–547.
- q. NELSON, G. S., 1958.—“*Schistosoma mansoni* infection in the West Nile district of Uganda. Part IV. Anaemia and *S. mansoni* infection.” **35** (10), 581–586.

(2300) Holmes discusses the conditions in which the host-parasite relationship may break down and whether any such relationship is really satisfactory to the host. He suspects that many effects of parasites in Africa are not recognized because they are not looked for. They are likely therefore to remain unrecognized until there is systematic observation and recording of findings. W.K.D.

(230p) In Part III of his extensive report on schistosomiasis in the West Nile region Nelson discusses splenomegaly in *Schistosoma mansoni* infections. As malaria is also present spleen indices do not give a proper indication unless the parasite rate is also determined. Out of 2,102 persons examined *S. mansoni* caused some splenic enlargement in younger persons particularly in children under 10 years old, where this infection caused an increase in the spleen rates of between 10% and 20%. Older children and adults were not affected, and Egyptian splenomegaly was not found. W.K.D.

(230q) Part IV of Nelson's extensive report deals with haemoglobin estimations to determine to what extent *Schistosoma mansoni* infections are disabling. Estimations by Sahli's method were made on 193 outpatients at the district hospital and on 421 students, all of whom were also examined for *S. mansoni* and hookworm. The variation between the outpatients, whether infected or negative, and the presumably healthy students was only slightly in favour of the latter. 777 persons in a heavily infected *S. mansoni* area were then examined. The results suggested that in such an area *S. mansoni* infection is one of the factors in the generally low haemoglobin levels which were slightly lower in infected children and adult women than in youths and adult males. W.K.D.

231—Economic Proceedings of the Royal Dublin Society.

- a. DUGGAN, J. J., 1958.—“Population studies on cereal root eelworm, *Heterodera major* (O. Schmidt, 1930).” **4** (6), 103–118.

(231a) Duggan grew varieties of oats, barley, wheat and rye in microplots of soil infested with the cereal root eelworm, *Heterodera major*. He found that the efficiency of the host plant varied with the crop, variety and seasonal factors. Oats proved to be the most efficient host, while rye was incapable of raising the population to a dangerous level. The level of infection under fallow or non-host crop falls by at least 40% per year, this fall being independent of the initial level of infection. Under grasses, the population tended to fall in the first year, but rose in the second year on some plots. Theories explaining this rise are discussed. J.J.H.

232—Evolution. Lancaster, Pa.

- a. MODE, C. J., 1958.—“A mathematical model for the co-evolution of obligate parasites and their hosts.” **12** (2), 158–165.

(232a) Mode considers the mathematical deductions which can be made from recent work on the genetics of pathogenicity and host-resistance to flax rust, *Melampsora lini*, with particular reference to (i) the consequences of the complementary genetic systems of host and parasite when both mate at random over long periods of time; (ii) the significance of linkage of genes for disease resistance; and (iii) the relationship which genetic systems bear to the co-evolution of obligate parasites and their hosts. It is concluded that in this particular

case the existing genetic systems represent the relics of ancient systems of balanced polymorphism, stemming from the time when wheat, barley and flax reproduced by outbreeding. It is further suggested that such dual systems of balanced polymorphism, one in the host population and one in the pathogen population, and due either to complementary genetic systems of the host and parasite or to linked genes for host resistance, have provided the mechanism for the co-evolution of obligate parasites and their hosts. [Although based on a particular set of non-helminthic data this thought-provoking paper, which very properly has a general title, should be of interest to helminthologists inasmuch as the mathematical techniques employed are susceptible of application to comparable problems in the field of helminthology.]

J.M.W.

233—Experimental Parasitology. New York.

- a. WEIMER, H. E., MARKELL, E. K. & NISHIHARA, H., 1958.—“Serum glycoprotein studies in experimental trichinosis.” **7** (5), 468-476.
- b. SAZ, H. J., VIDRINE, Jr., A. & HUBBARD, J. A., 1958.—“The formation of α -acetolactic acid and acetylmethylcarbinol by *Ascaris lumbricoides*.” **7** (5), 477-490.
- c. YOELI, M., ALGER, N. & MOST, H., 1958.—“Studies on filariasis. I. The behavior of microfilariae of *Dirofilaria immitis* in the wax moth larva (*Galleria mellonella*).” **7** (6), 531-541.
- d. ARCHER, D. M. & HOPKINS, C. A., 1958.—“Studies on cestode metabolism. V. The chemical composition of *Diphyllbothrium* sp. in the plerocercoid and adult stages.” **7** (6), 542-554.

(233a) Weimer *et al.* studied the effect of cortisone (3 mg. per day for 30 or 60 days) on the properties of the blood of rats which had been infected with *Trichinella spiralis*. Some of the rats were given a second dose of larvae, five months after the first dose. Infections were largest in animals which had been given two doses of larvae, and cortisone for 60 days. In this group also, normal haemoglobin and haematocrit values were obtained. Increased serum glycoprotein values, due largely to increases in the polysaccharide moiety of the globulin fraction, were obtained in all animals treated with cortisone for 60 days. Subnormal seromucoid values were found in all infected groups.

W.P.R.

(233b) Saz *et al.* found that whole *Ascaris lumbricoides* and homogenates of the muscle produced acetylmethylcarbinol. The addition of pyruvate or acetaldehyde increased production; greatest amounts were obtained with both substrates present (121.3 mg. per gramme of live *Ascaris* in 19 hours). Homogenates also catalysed the formation of α -acetolactic acid from pyruvate. Attempts to demonstrate α -acetolactic acid decarboxylase failed.

W.P.R.

(233c) Blood containing microfilariae of *Dirofilaria immitis* was injected into the haemocoel of 706 caterpillars of *Galleria mellonella*. In caterpillars kept at 24°C.-28°C., larvae had begun to develop in the haemolymph by the third day, and sausage forms predominated by the end of the fourth day. No development beyond the sausage stage was observed although some larvae remained alive for as long as 16 days. Out of 334 caterpillars which were dissected at various times after inoculation of microfilariae, 153 showed sausage forms. Cellular reactions were frequently found after seven days, and blackening and chitinization of microfilariae were also observed. No further development of the parasites occurred when haemolymph containing sausage forms was subinoculated into clean caterpillars, or when fresh haemolymph was injected into caterpillars already containing developmental forms. No development at all occurred when the caterpillars were kept at 37°C., although the larvae survived up to eight days. The proportion of caterpillars containing developmental forms compares favourably with the results of previous workers using *Aedes aegypti* and *A. cantans* as experimental hosts, and definitely surpasses results obtained with *Anopheles stephensi* and *A. gambiae*.

W.A.F.W.

(233d) Archer & Hopkins found the content of water (69.9%), glycogen (31.5%) and total nitrogen (6.4%) of fresh plerocercoids of *Diphyllbothrium* sp. was constant during growth in the fish. In the rat the composition changed during the first three days but then became stable at water 69%, glycogen 37.5% and total nitrogen 7.3%.

W.P.R.

234—FAO Plant Protection Bulletin. Rome.

- a. MINZ, G., 1958.—“*Meloidogyne javanica* in strawberry roots.” 6 (6), 92.

(234a) Minz reports the presence of galls of the root-knot nematode, *Meloidogyne javanica* on strawberry, a new host for this parasitic nematode.
H.R.F.

235—Hemera Zoa. Buitenzorg.

- a. TANDJUNG ADIWINATA, R., 1958.—“Daftar tambahan tjatjing² jang berparasit pada hewan menjusui dan unggas di Indonesia.” 65 (5/6), 231–233. [English, French & German summaries p. 233.]
- b. HOLZ, J. & TANDJUNG ADIWINATA, R., 1958.—“Ueber ‘Sandfliegen’ in Indonesien.” 65 (7/8), 21–42. [English & Indonesian summaries pp. 40–41.]
- c. TANDJUNG ADIWINATA, R., 1958.—“Strongilosis paru pada ternak di Indonesia.” 65 (7/8), 77–81. [English summary p. 81.]

(235a) Tandjung Adiwinata gives a supplementary list of helminths from mammals and birds in Indonesia. It includes also the hosts and the localization of the parasites in them.
N.J.

(235b) Holz & Tandjung Adiwinata give a key to the four species of blood-sucking sandflies of the family Ceratopogonidae and describe, with figures, the species found in Indonesia. These Ceratopogonidae are of importance in the transmission of bovine filariasis.
A.E.F.

(235c) Tandjung Adiwinata reports that *Dictyocaulus filaria* has been introduced into Indonesia in recent years by imported Texel sheep. He also presents a short account of lung-worm disease in domestic animals in Indonesia, dealing with *D. viviparus* and *Metastrongylus apri*, as well as *D. filaria*.
A.E.F.

236—Indian Journal of Malariology.

- a. KRISHNAN, K. S., RAGHAVAN, N. G. S., NAIR, C. P. & MAMMEN, M. L., 1958.—“Comparative field trials on the residual effectiveness of D.D.T., malathion and diazinon.” 12 (1), 43–48.
- b. NARAYANDAS, M. G. & RAY, A. P., 1958.—“A rapid staining technique for microfilaria. Part I. Sheathless microfilaria.” 12 (1), 67–70.
- c. SUBRAMANIAM, H. & TAMPI, M. R. V., 1958.—“Notes on the seasonal variations in the density of *Culex fatigans* and filarial infections in them, in Mangalore Town, Madras State.” 12 (2), 77–88.
- d. SINGH, D., KRISHNASWAMI, A. K. & RAGHAVAN, N. G. S., 1958.—“A new microfilaria in the dog.” 12 (2), 89–92.
- e. GUJRAL, J. S., 1958.—“Urban, semi-urban and rural filariasis in Ballia District, Uttar Pradesh.” 12 (2), 101–108.
- f. SUBRAMANIAM, H., RAMOO, H. & SUMANAM, S. D., 1958.—“Filariasis survey in the Laccadive, Minicoy and Amindivi Islands, Madras State.” 12 (2), 115–127.

(236a) Krishnan *et al.* carried out comparative field trials on the residual effectiveness of D.D.T., malathion and diazinon against mosquitoes in general and culicines in particular in Shertallai Taluk of Kerala State—an area highly endemic for malayan filariasis, of which *Mansonioides annulifera* and *M. uniformis* are the vectors. They found that D.D.T. sprayed at 200 mg. per sq. ft. was effective for five weeks; whereas malathion and diazinon, each sprayed at 25 mg. per sq. ft., were effective only for three weeks.
J.M.W.

(236b) Narayandas & Ray describe a technique which allowed rapid staining of the microfilariae of *Dirofilaria repens* and *D. immitis*, with good differentiation of the various regions and nuclei. An air-dried smear was dehaemoglobinized in 20% ethyl alcohol and then fixed for two minutes in a mixture of nine parts 70% ethyl alcohol, 0.5 part formaldehyde and 0.5 part normal hydrochloric acid. The excess fixative was removed by washing in running

tap-water. The smear was stained in J.S.B. II (Jaswant Singh & Bhattacharji) for 30 seconds, washed in water buffered pH 6.4 to 6.8 and then stained in J.S.B. I for 40 seconds followed by another wash in buffered water. The stained smear was dried in air before examination. Excess stain was removed by washing in a saturated solution of potassium dihydrogen phosphate and then washing in buffered water. J.E.D.K.

(236c) During the monsoon months of June to October *Culex fatigans* breeds in pools, house-drains and other water near houses; immediately after the monsoon period the mosquitoes also breed in the paddy fields and the stagnant rain-water drains, resulting in a rapid rise in population. The infection rate of *C. fatigans* with *Wuchereria bancrofti* larvae is high during the monsoon months, when the atmospheric humidity is high and the mosquito density is low, but drops to a lower level after the end of the monsoon when the relative humidity falls below 80% and the mosquito density rises. Transmission of filariasis is possible throughout the year in Mangalore and the chances of transmission are very high during the wet season. Anti-larval measures have not reduced the density of *C. fatigans* below 12 per man-hour even at the height of the monsoon. W.A.F.W.

(236d) The microfilariae of *Dirofilaria immitis* and *D. repens* and a new microfilaria, which were found in the blood of a dog from Orissa, India, were examined in thick blood smears. The periodicity of the new microfilaria could not be determined as there were too few present in the blood, but the maximum numbers of microfilariae of *D. immitis* and *D. repens* were found at 21.00 hours. The new type of microfilaria differs from those of *D. immitis* and *D. repens* in the following points: it is shorter and wider; the beginning of the nuclear column, the nerve ring and the excretory pore are further from the head; there is one nucleus in the cephalic space as against none in *D. immitis* and two in *D. repens*; the nuclei of the nuclear column are discrete and round instead of overlapping and smudged and the tail tapers gradually to a blunt point instead of to a fine thread as in *D. immitis* and *D. repens*. W.A.F.W.

(236e) A filariasis survey was carried out in one urban area (Ballia), semi-urban areas and 23 villages. *Wuchereria bancrofti* was found at every place visited. The vector is *Culex fatigans*. Between May and August 1956 its density in urban areas was 56 per man-hour and in non-urban areas 23.9 per man-hour, while the corresponding infection rates with filarial larvae were 4.1% and 1.6%. The survey showed that infection rates, numbers of microfilariae per 20 cu.mm. of blood, disease rates and endemicity rates were highest in the urban area, less in the semi-urban areas and lowest in the villages. The infection rate in pre-school children in urban areas was twice the rate in rural areas. Data from hospitals and dispensaries suggested that filariasis had been increasing gradually from 1951 to 1955. W.A.F.W.

(236f) In a survey of nine of the ten Laccadive, Minicoy and Amindivi Islands, filariasis due to *Wuchereria bancrofti* was found on six and the infection rates, which were estimated by examining approximately 10 cu.mm. of blood, ranged from 4.2% to 18.2%, average 11.4%. *Culex fatigans* predominated on the six islands where filariasis was found, and filarial larvae were found by dissection of *C. fatigans* from five of these islands. *C. vishnui* predominated on the three islands where filariasis was not found. W.A.F.W.

237—Indian Veterinary Journal.

- a. MOHIYUDDIN, S., 1958.—“A note on cerebrospinal nematodiasis as the probable cause of bovine paralysis and its treatment.” 35 (12), 624-625.

(237a) An unidentified nematode was found in transverse sections of the spinal cord of a cow from the Sagar area [Mysore State] reported to have died of paraplegia. 20 typical cases of bovine paraplegia were given caricide at the rate of 80 mg. to 100 mg. per kg. body-weight and all but two advanced cases recovered completely. M.MCK.

238—Japanese Journal of Medical Science and Biology.

- a. KOMIYA, Y. & KOJIMA, K., 1958.—“A crossing experiment of *Oncomelania nosophora* with *O. hupensis* (preliminary report).” **11** (3), 185–186.

(238a) Komiya & Kojima report the successful crossing of *Oncomelania nosophora* from Japan with *O. hupensis* from Kwangtung Province, China. Young specimens were isolated before sexual maturity and placed in dishes in pairs, one individual of each species. Sixteen pairs were thus prepared and seven months later 12 young were found in one dish. The young all developed and resembled the male parent (*O. nosophora*) in the poorly defined striae on the shell and the mother (*O. hupensis*) in colour. C.W.

239—Journal of the American Society of Sugar Beet Technologists.

- a. HOLST, E. M. & CORMANY, C. E., 1958.—“Effects of some soil treatments on yield of sugar beets in soil infected with sugar beet nematode and *Rhizoctonia* root rot.” **10** (1), 56–59.

(239a) Soil treatments using six nematicides, chloropicrin and molasses-pulp failed to give control of *Rhizoctonia* root rot and sugar-beet eelworm in a small field of sugar-beet in Colorado. H.R.W.

240—Journal of the American Veterinary Medical Association.

- a. ROENIGK, W. J., 1958.—“Surgical removal of canine heartworms by pulmonary arteriotomy.” **133** (12), 581–585.

(240a) Roenigk describes a technique for the surgical removal of canine heartworms (*Dirofilaria immitis*) by pulmonary arteriotomy applied in 36 operations on 30 dogs. None of the animals had clinical signs of cardiac failure. Intestinal worms were removed before the operation. Occlusion of the circulatory inflow to the heart was obtained by placing umbilical tapes around anterior and posterior venae cavae, permitting entry of blood only from the azygos vein. A 1.5–3 cm. longitudinal incision was made through a portion of the pulmonary artery clamped with a Satinsky clamp. Two 5–0 silk sutures were placed through the incision. An occlusion time of 3.5 minutes was ample for the extraction of the worms, 30 or more being removed in that time. Three dogs died within four hours after the operation. A second operation on six dogs revealed slight thickening of the pulmonary arteries at the site of arteriotomy, but there was no thrombus formation. At autopsy of 16 surgically treated dogs it was found that all the adult worms had been removed with the exception of one. N.J.

241—Journal of Comparative Pathology and Therapeutics.

- a. GIBSON, T. E., 1958.—“The development and survival of the preparasitic stages of *Nematodirus* spp. on pasture herbage.” **68** (3), 338–344.
 b. SOULSBY, E. J. L., 1958.—“Studies on the heterophile antibodies associated with helminth infections. II. Heterophile antibody in *Ascaris lumbricoides* infection in pigs.” **68** (3), 345–351.
 c. SENEVIRATNA, P., 1958.—“Parasitic bronchitis in cats due to the nematode *Anafilaroides rostratus* Gerichter, 1949.” **68** (3), 352–358.
 d. ROSE, J., 1958.—“Site of development of the lungworm *Muellerius capillaris* in experimentally infected lambs.” **68** (3), 359–362.
 e. SOULSBY, E. J. L., 1958.—“Studies on the heterophile antibodies associated with helminth infections. III. Heterophile antibody in *Oesophagostomum dentatum* infection in pigs.” **68** (4), 380–387.
 f. PARKER, W. H. & ROBERTS, H. E., 1958.—“Observations on experimental parasitic bronchitis in calves and the response to diethylcarbamazine.” **68** (4), 402–410.

(241a) Faecal pellets containing eggs of *Nematodirus filicollis* and *N. battus* were placed on grass plots at monthly intervals and each plot observed for the survival of eggs and larvae throughout the following year. The eggs of *N. battus* developed more slowly than those of *N. filicollis* and did not hatch until the spring of the following year. The development of eggs

of *N. filicollis* takes only about eight weeks excepting for those eggs passed during the winter and autumn when the development is arrested at the morula stage. All the various pre-parasitic stages of both parasites appear to be capable of surviving the winter. It is therefore necessary, in order to avoid outbreaks of nematodiriasis, to ensure that lambs graze only on pastures which were not contaminated in the spring of the previous year. K.H.

(241b) Infection of pigs with *Ascaris lumbricoides* stimulates the production of a heterophile antibody, detectable by the direct agglutination test, and sometimes reaching high levels. This antibody, which follows the course of other anti-*Ascaris* antibodies has a very low haemolytic ability and is thought to be comparable to a low molecular weight antibody seen in rabbits following injection of sheep cells. The significance of such a heterophile antibody in pigs infected with *A. lumbricoides* is difficult to ascertain. In the present work high titres of heterophile antibody were shown but these did not prevent or mitigate the infection in the pig and it is probably an unimportant antibody in *A. lumbricoides*. K.H.

(241c) Infections with *Anafilaroides rostratus* in cats cause eosinophilia, chronic bronchitis and peribronchitis with marked hyperplasia of the bronchial mucosa and mild coughing. This infection has only been recorded in Palestine and the Kandy district of Ceylon. The author has tried the therapeutic effects of sodium iodide, piperazine hydrate and antimosan. Sodium iodide was ineffective. Piperazine hydrate caused a decrease in the number of larvae produced. Antimosan also produced a reduction in the number of larvae and at the post-mortem dead worms were found: but unfortunately the drug appeared to be rather toxic. K.H.

(241d) This paper is a report of the author's observations on the course and site of development of *Muellerius capillaris* in the sheep. Four lambs were given 60 to 70 infective *M. capillaris* larvae on five consecutive days every week for 44 weeks. At the end of this period the lambs were slaughtered and the lungs examined. It was established that development from the fourth-stage larva to the adult worm takes place within lesions in the lung tissues. No support was found for the theory that adult lungworms live for some time in the arterioles. The host-parasite relationship was also examined and it was observed that the reaction of the host's tissue which encloses the parasite within a lesion often results in the isolation of lungworms from one another with the consequence that not all females produce fertile eggs. It is possible that no fertile eggs or first-stage larvae may be produced and thus examination of faeces may be of limited use in the diagnosis of *M. capillaris* infection. K.H.

(241e) Soulsby found that the titre of heterophile antibodies of the Forssman type was increased when rabbits and pigs were infected with *Ascaris lumbricoides*. *Oesophagostomum dentatum* also increased the titre of these antibodies in the pig. The significance of these results are discussed in detail. W.P.R.

(241f) This paper reports on the response of calves infected with parasitic bronchitis to diethylcarbamazine treatment. Comparison is made between intramuscular and oral routes of administration and it was shown that the intramuscular route was very slightly superior. Doses of 10 mg. per lb. body-weight of diethylcarbamazine given by either route on five consecutive days commencing on the 14th day after infection, successfully terminated the infection. Doses of 1 mg. per lb. body-weight given over a similar period by intramuscular injection were ineffective. The beneficial effect of treatment started immediately with a fall in respiratory rate, increase in weight and reduced faecal larval count. The last-named feature was particularly noticeable following intramuscular injection. The surviving animals were challenged on the 44th day and the reactions suggested that immunity was of a lower order in calves which had been successfully treated than in animals which had attained natural "self cure". K.H.

242—Journal of the Egyptian Medical Association.

- a. HALAWANI, A., EL RAIH, F. & SADEK, G., 1958.—“On the morphology and nomenclature of *Biomphalaria alexandrina* (Ehrenberg, 1831) versus *B. boissyi* (Potiez and Michaud, 1838).” **41** (1), 1–5.
- b. SHAFEL, A. Z., 1958.—“Preparation 17581 (hydrochloride of I- β -diethylamino-ethylamino-4, 6, 8 trimethyl-azathioxanthone). Clinical trials on patients infected with *Schistosoma haematobium*—a preliminary report.” **41** (1), 6–10.
- c. KENAWY, M. R. & EL-MAWLA, N. G., 1958.—“Study of the bone marrow and blood in bilharzial cirrhosis of the liver before and after splenectomy.” **41** (2), 85–92.
- d. RIFAAT, M. A. & NAGATY, H. F., 1958.—“The incidence of intestinal parasitic infections among the inhabitants of Cairo.” **41** (3/4), 164–173.
- e. NAGATY, H. F., RIFAAT, M. A., KHALIL, H. M. & ESSAWY, M. A., 1958.—“Oxyphenonium bromide and other drugs as ameliorating factors against acute toxic manifestations of tartar emetic therapy.” **41** (5/6), 251–257.
- f. NAGATY, H. F., 1958.—“List of trematodes of fishes and their hosts, so far recorded by the author from the Red Sea.” **41** (9/10), 455–460.

(242a) Halawani, El Raih & Sadek have shown that there are two morphologically distinct forms of *Biomphalaria* in Egypt, one which is common and one which they report only from the Imbaba district. The authors discuss the question of the nomenclature of these two forms and conclude that the one from Imbaba should be referred to *B. boissyi boissyi* while the common one should be called *B. boissyi alexandrina*. C.W.

(242b) A new variant of the thioxanthone formula, 1- β -diethylaminoethylamino-4,6,8 trimethyl-5-azathioxanthone hydrochloride (Ciba 17581), was given clinical trial in 60 cases of urinary schistosomiasis. The drug was given orally. One group received 10 mg. to 15.6 mg. per kg. body-weight daily for 10 days (total dose 100 mg. per kg.) while the other group was given 8.3 mg. to 12.5 mg. per kg. daily for 21 to 24 days (total dose 175 mg. to 262 mg. per kg.). The cure rates were 33% and 25% respectively. Although the results were rather more favourable with the higher daily dose this could not be continued for a longer period because of the incidence of side effects which consisted mainly of gastro-intestinal derangements. O.D.S.

(242d) Worm infections were found in 253 of 948 patients from the lower and middle classes of Cairo who were attending the skin department in the outpatients section of a hospital. The incidence of the different worm species was as follows: *Ascaris lumbricoides* 11.6%, *Ancylostoma duodenale* 7%, *Hymenolepis nana* 6.5% and *Trichostrongylus* spp. 4.3%. *Schistosoma mansoni*, *Trichuris trichiura* and *Heterophyes heterophyes* were the least common worms. Among 70 patients from the country, 23 had *Ascaris lumbricoides* infection, 22 had *Ancylostoma duodenale*, seven had *Hymenolepis nana* and five had *Trichostrongylus* spp. M.MCK.

(242e) Of 34 cases of schistosomiasis treated with tartar emetic, 17 developed symptoms severe enough to warrant supportive treatment in an attempt to reduce the toxic effects of the drug. Oxyphenonium bromide, a vagolytic drug, was given mixed with tartar emetic at the rate of 50 mg. to 100 mg., according to age. No improvement was observed except in some cases exhibiting nausea, vomiting and sweating. No improvement was observed following supportive treatment with Hystadil or Novalgin whilst treatment of one case with Antistine was followed by collapse. O.D.S.

243—Journal of Experimental Biology.

- a. MANN, K. H., 1958.—“Seasonal variation in the respiratory acclimatization of the leech *Erpobdella testacea* (Sav.).” **35** (2), 314–323.
- b. WILSON, P. A. G., 1958.—“The effect of weak electrolyte solutions on the hatching rate of the eggs of *Trichostrongylus retortaeformis* (Zeder) and its interpretation in terms of a proposed hatching mechanism of strongyloid eggs.” **35** (3), 584–601.

(243a) In the summer, but not the winter, the leech *Erpobdella testacea* can become acclimatized to maintain a constant rate of oxygen consumption at oxygen concentrations as low as one-third air saturation in the water. This acclimatization occurs even when haemoglobin

is inactivated. In normal air-saturated water at 20°C., about 45% of the oxygen is transported by the haemoglobin but in one-third saturated water only 25%. After a meal of *Tubifex*, the air consumption increases three-fold returning to the previous level within four days. For these experiments Mann has used and describes a polarographic respirometer embodying a wide-bore dropping mercury electrode which provides on a galvanometer a constant indication of the oxygen concentration in the water.

G.I.P.

(243b) Wilson shows that solutions of sodium chloride and eight other electrolytes slow down the rate of hatch of *Trichostrongylus retortaeformis* eggs without effecting the "hatchability" of the eggs. Earlier processes of development are not slowed down. Depression of the hatching rate is proportional to the mobility of the ions in solution. On the assumption that this effect is due to ionic penetration of the egg membrane or membranes it is shown that this is controlled by the speed of the slower ion in any one salt. The action of Teepol in antagonising the effect of sodium chloride is taken as evidence that the net effect of ionic solutions is on the rate of breakdown of the inner wax-like layer of the egg and therefore on the water permeability of the egg. However the similar action of other emulsifying compounds is unexplained. A suggested hatching mechanism for strongyloid eggs involves two processes, the first being dependent on the osmotic relationships of the larva and its environment and the second being a chemical weakening of the outer shell. It is further suggested that the concentration of electrolytes in dehydrated faecal material, by depressing the rate of hatching, will prevent the first-stage larva from being released into an unsuitable environment.

J.E.D.K.

244—Journal of Experimental Medicine.

- a. SHOPE, R. E., 1958.—"The swine lungworm as a reservoir and intermediate host for hog cholera virus. I. The provocation of masked hog cholera virus in lungworm-infested swine by ascaris larvae." **107** (5), 609–622.
- b. SHOPE, R. E., 1958.—"The swine lungworm as a reservoir and intermediate host for hog cholera virus. II. Attempts to demonstrate the presence of hog cholera virus in lungworms derived from swine with cholera." **108** (1), 159–169.

(244a) The author has shown that in a limited number of cases hog cholera (swine fever) can be induced in pigs by feeding earthworms infected with lungworm larvae which have originated from eggs obtained from pigs infected with swine fever. In the majority of animals the virus remains in a masked state but the incidence of virulent infection can be increased by stress. In these experiments the administration of embryonated eggs of *Ascaris* from a swine fever-free source was sufficient to provoke a virulent infections in some pigs.

K.H.

(244b) Shope has investigated the effect of intramuscular administration of adult pig lungworm suspensions on the incidence of hog cholera (swine fever) cases in lungworm-free and lungworm-infected pigs. In both groups he obtained approximately the same incidence of infection. It was also shown that animals which had not developed any sign of hog cholera following the intramuscular injection of adult lungworm suspension were more likely to develop the disease following ingestion of lungworm larvae of cholera origin than were pigs which had not received the injection. Seasonal variation was again found and a regularly reproducible result was found only during the first five months of the year. This work serves to emphasize Shope's original conclusion that the lungworm serves as a reservoir and intermediate host for hog cholera in a masked form which may become pathogenic with stress.

K.H.

245—Journal of Helminthology.

- a. DISSANAIKE, A. S. & BILIMORIA, D. P., 1958.—"On an infection of a human eye with *Philophthalmus* sp. in Ceylon." **32** (3), 115–118.
- b. GOIL, M. M., 1958.—"Protein metabolism in trematode parasites." **32** (3), 119–124.
- c. FENWICK, D. W. & WIDDOWSON, E., 1958.—"The conduct of hatching tests on cysts of the potato root eelworm *Heterodera rostochiensis* (Woll.)." **32** (3), 125–134.

- d. COLE, C. S. & HOWARD, H. W., 1958.—“Observations on giant cells in potato roots infected with *Heterodera rostochiensis*.” **32** (3), 135–144.
- e. SANDARS, D. F., 1958.—“On some trematodes from the manicou, *Didelphis marsupialis insularis* (Allen) from the West Indies.” **32** (3), 145–158.
- f. METTRICK, D. F., 1958.—“Helminth parasites of Hertfordshire birds. II. Cestoda.” **32** (3), 159–194.
- g. EDWARDS, E. E. & WILSON, A. S. B., 1958.—“Observations on nematode infections of goats and sheep in West Africa.” **32** (4), 195–210.
- h. FITZSIMMONS, W. M., 1958.—“On *Probstmayria reptiliae* n.sp., from *Homopus femoralis* and some notes on the genus *Probstmayria*.” **32** (4), 211–218.
- i. ELLENBY, C., 1958.—“Preliminary observations on the colorimetric assay of the hatching factor of the potato-root eelworm, *Heterodera rostochiensis* Wollenweber.” **32** (4), 219–226.
- j. YEH, L. S., SYMES, C. B. & MATAIKA, J. U., 1958.—“On a new filarioid worm, *Chiroptero-filaria brevicaudata* gen. et sp.nov. from the fruit bat, *Pteropus hawaiiensis* from Fiji.” **32** (4), 227–232.
- k. SINGH, S. N., 1958.—“On a new species of *Euparadistomum* (Dicrocoeliidae Odhner, 1910) from the fox in Hyderabad (India).” **32** (4), 233–238.
- l. SINGH, S. N., 1958.—“On a new species of *Stephanofilaria* causing dermatitis of buffaloes' ears in Hyderabad (Andhra Pradesh) India.” **32** (4), 239–250.
- m. SINGH, S. N., 1958.—“On *Trichocheenia mucronata* n.sp. and a new subfamily Trichocheeniinae (Trichostrongylidae Leiper, 1912).” **32** (4), 251–258.
- n. SINGH, S. N., 1958.—“On an interesting new nematode *Velariocephalus trilokiae* gen. et sp. nov. from an Indian frog and a new subfamily Velariocephalinae (Cosmocercidae).” **32** (4), 259–266.

(245a) Dissanaiké & Bilimoria report the removal of an adult specimen of *Philophthalmus* sp. from the right eye of a 52-year-old Indian Moor. The only symptom was ocular irritation. This man, a resident of Ceylon, while on a visit to Tinnevely District, South India, bathed almost daily for several months in a stream frequented by ducks and crows. The parasite is described and figured but specific identification is not attempted. This is the second record of this genus from man. J.M.W.

(245b) Goil gives the mean values for the total body nitrogen in *Paramphistomum explanatum* as 8.47% of the dry weight, for *Gastrothylax crumenifer* the figure was 7.8%, and for *Fasciola gigantica*, 10.64%. Ammonia produced by these parasites in non-nutrient culture media under axenic conditions in air during twelve hours at 37°C. ranged from 3.95 to 2.51% of the total body nitrogen; for uric acid the figures ranged from 0.1 to 0.03%. W.P.R.

(245c) Starting with the extraction of potato-root eelworm cysts from infested soil, the collection of potato-root diffusate and the apparatus and methods used in setting up replicate batches of cysts for hatching and counting of the hatched larvae, Fenwick & Widdowson give recommendations for preliminary assays of the cysts which enable the conditions for the main tests to be laid down. The interpretation of results is discussed. A further paper will deal with statistical considerations underlying the methods described. M.T.F.

(245d) Cole & Howard have sectioned Majestic potato roots grown in soil infested with potato-root eelworm for 14, 21, 28, 35 and 45 days. In the 14-day-old roots there was enlargement of cells of the cortex, endodermis, pericycle and stele parenchyma. In the 21-day-old roots giant cells were seen in the cortex, endodermis and pericycle. In older roots giant cells were most often found in the pericycle and stele parenchyma; those in the cortex were only near the eelworm's head and they always occurred in a single radial row as seen in transverse sections. Where giant cells occurred in the stele no secondary xylem was produced. Break-down of cell walls between giant cells was rarely observed. M.T.F.

(245e) Sandars records *Achillurbainia recondita*, *Metadelphis evandroi* and *Rhopalias coronatus* from the manicou (*Didelphis marsupialis insularis*) from Trinidad, British West Indies. All three species are described and figured. The phylogenetic and zoogeographical significance of these findings is discussed. J.M.W.

(245f) Mettrick has found 16 species of cestodes in birds in Hertfordshire of which three are new; a number of new host and geographical records are made. Concise descriptions are given of the previously reported species based on this material. *Anomotaenia verulamii* n.sp. from *Turdus ericetorum ericetorum* is distinguished from other species of the genus by the combination of the following characters: the possession of 20 hooks arranged in a double row, those of the first row measuring 0.063 mm. to 0.065 mm. in length and those of the second row 0.049 mm. to 0.053 mm.; there being 20 to 24 testes in a mature segment; the size of the cirrus sac which is 0.24 mm. long by 0.048 mm. wide; [in the table only the measurement of the second row of hooks is given and the number of testes is given as 24 to 28]. *Paricterotaenia albani* n.sp. from *Sturnus vulgaris vulgaris* resembles *P. parina* most closely but may be distinguished from it by the presence of 26 hooks with a maximum length of 0.022 mm. in the new species, compared with 20 hooks with a maximum length of 0.02 mm. in *P. parina*, the greater length of the cirrus sac, the less well developed vagina and the absence of an ovarian bridge. *P. mariae* n.sp. from *Erithacus rubecula melophilus* is readily and easily distinguished from all other species of the genus by the number and size of the rostellar hooks—10 hooks 0.048 mm. to 0.05 mm. long [the table gives 52 to 53 μ long]. s.w.

(245g) Edwards & Wilson investigated the worm burden of sheep and goats in Ghana by making fortnightly faecal egg counts over the three-year period 1954–1956. Flocks at Achimota, Asuansi, Pokoasi and Nungua were studied. Apart from *Moniezia expansa* and an occasional egg of *Schistosoma bovis* (in sheep) only nematode eggs were encountered. In the dry coastal plains worm egg production reached peak levels in June and November, following the two rainy periods (April–May–June and October). In the forest belt regions, owing to higher and better distributed rainfall, there is good growth of herbage throughout the year, and seasonal variations in worm burden were therefore irregular and less pronounced. Temperature was unimportant as a factor in seasonal variation of worm burden. Local races of goats and sheep could tolerate very heavy parasite loads. Heavy infection was observed in the first year of life but, provided the host survived, resistance developed thereafter and the worm burden gradually diminished below the danger level. Imported British and South African breeds of sheep have proved more susceptible to nematodiasis than the local breeds. J.M.W.

(245h) Fitzsimmons describes a new species, *Probstmayria reptiliae*, from a tortoise (*Homopus femoralis*) in South Africa, this being the first report of a species of this genus from a reptilian host. The new species is distinct in having unequal bent spicules and a gubernaculum in the male and in the vulva being posterior to the mid-point of the body in the female. A key is given for the four species currently referred to the genus *Probstmayria* and the genus is diagnosed. The author argues that *Probstmayria* should be referred to the family Oxyuridae, which should be redefined to accept it, and that the subfamily Probstmayriinae Kreis, 1955 should be recognized. W.G.I.

(245i) Empirical tests on the hatching factor of potato-root eelworm by colorimetric assay were made with picric acid and with 3:5-dinitrobenzoic acid. Results from colorimetric assay, assay by perfusion of frogs' hearts and hatching assay of cysts in watch-glasses showed good agreement. Ellenby stresses the empirical nature of this work since comparisons are essentially based on the assumptions that the potato-root diffusate hatching factor is lactonic and that the root-diffusate does not contain other substances which would influence the assay methods. H.R.W.

(245j) Yeh, Symes & Mataika describe the adult and microfilaria of a new genus and species of nematode, *Chiropterotharia brevicaudata* n.g., n.sp. from the peritoneal cavity of a fruit bat (*Pteropus hawaiiensis*) in Fiji. The new genus is considered to be most closely related to *Lemdana* from which it is easily distinguished by the form of the spicules and in having a long narrow oesophagus which, in the female, usually makes several coils round the vagina. A new species of microfilaria, *M. fijiensis*, is also described from the same host but no adults were found. W.G.I.

(245k) *Euparadistomum buckleyi* n.sp. from the gall-bladder of *Vulpes alopes* is described. It possesses a pyriform body, a genital pore posterior to the intestinal bifurcation, a ventral sucker larger than the oral sucker, swollen intestinal caeca, and testes which are smaller than the ventral sucker and ovary. Singh supports the validity of the subfamily Euparadistominae Buckley & Yeh, 1958 and the genus *Euparadistomum* Tubangui, 1931. A key is given to the eight species of the genus. B.L.J.

(245l) Singh describes a new species of nematode, *Stephanofilaria zaheeri* from the skin of the ear of buffalo in Hyderabad, India. This nematode causes ear-sore. The new species differs from *S. stilesi* and *S. assamensis* in not having lateral alae, from *S. dedoesi* and *S. assamensis* in having a distinct anus and from all the species of the genus in the number and arrangement of the caudal papillae of the male—there are three pairs of post-anal ventral papillae and eight pairs of pre-anal papillae. A key is given to the five species now referred to the genus *Stephanofilaria* and the taxonomic position of the genus is considered, the author concluding that the status of Stephanofiliariidae and the affinities of *Stephanofilaria* must be uncertain until the structure and mode of transmission of the larva are known. W.G.I.

(245m) Singh describes a new species, *Trichocheenia mucronata*, from a pangolin (*Manis pentadactyla*) in India. The species is considered distinct because the male possesses unequal ventral bursal rays and the lateral process of the spicule is shorter than that in any of the known species, and because the caudal mucro is shorter than the width of the tail in the female. *Trichocheenia manisa* Kou, 1958 is considered a synonym of *T. cantonensis*. After discussion the genera *Trichocheenia*, *Maciella*, *Delicata* and *Angulocirrus* are referred to a new subfamily, Trichocheeniinae, of the family Trichostrongylidae. The subfamily is restricted to edentates and is characterized by an accessory membrane on the male tail supported by two rays and by the presence of a cuticular cephalic inflation. A key is given to the four genera referred to the new subfamily. W.G.I.

(245n) Singh describes a new genus and species of nematode, *Velariocephalus trilokiae*, from a frog (*Rana cyanophlyctis*) in India. The parasite is considered to be referable to the family Cosmocercidae and to resemble *Nematoxyinema piscicola* (Linstow, 1907) but to differ from it in the shape of the head and the male tail. The parasite is, in addition, considered sufficiently distinct to necessitate the introduction of a new subfamily name, Velariocephalinae, to which subfamily the genus *Nematoxyinema* Skrjabin & Schikhobalova, 1951 is also referred. The new genus and subfamily are diagnosed. W.G.I.

246—Journal of the Marine Biological Association of the United Kingdom.

- a. LLEWELLYN, J., 1958.—“The adhesive mechanisms of monogenetic trematodes: the attachment of species of the Diclidophoridae to the gills of gadoid fishes.” 37 (1), 67–79.
- b. COLES, J. W., 1958.—“Nematodes parasitic on sea weeds of the genera *Ascophyllum* and *Fucus*.” 37 (1), 145–155.
- c. FREEMAN, R. F. H. & LLEWELLYN, J., 1958.—“An adult digenetic trematode from an invertebrate host: *Proctoeces subtenuis* (Linton) from the lamellibranch *Scrobicularia plana* (Da Costa).” 37 (2), 435–457.

(246a) Llewellyn has studied the adhesive organs of *Diclidophora merlangi*, *D. denticulata*, *D. luscae*, *D. macruri*, *D. minor*, *D. palmata*, *D. phycidis*, *D. pollachii* and *D. gadi*. He has adopted, with some modifications and extensions, Cerfontaine's notation for the identification of various structures. Cerfontaine's conception of a hinged clamp operated by both intrinsic muscles and a suckorial device is confirmed and Sproston's theory of a “sprung” clamp operated by extrinsic muscles attached to the skeletal framework disproved. In each of these nine species the adhesive organ consists of a pair of dissimilar opposable hinged jaws. The anterior jaw is deeply hollowed and relatively fixed; the posterior jaw is shallow and is movable about its hinged attachment to the anterior jaw. Movement is effected by both intrinsic and extrinsic muscles, the extrinsic muscle acting on a diaphragm to produce a suction pressure. The specific differences are discussed and the paper is illustrated by stereograms, line drawings and photomicrographs. S.W.

(246b) Coles gives a redescription of *Halenchus fucicola* (de Man, 1892) Cobb, 1933 and a description of *H. dumonicus* n.sp. together with figures of both. The latter species differs from *H. fucicola* in being slightly larger, in the shape of the spicules, in the larger post-vulval sac, the slightly more posterior vulva and the somewhat longer stylet. *H. dumonicus* occurred in galls on *Fucus vesiculosus* and *F. serratus* on the shores of Devon and Cornwall. J.B.G.

(246c) Freeman & Llewellyn describe and illustrate the morphology of adult *Proctoeces subtenius* from the kidney of *Scrobicularia plana*. The distribution of these forms in this lamellibranch on the British coast appears to be strictly limited at present—almost all of 1,000 examined from Chalkwell were infected and three of 150 from Whitstable but no *P. subtenius* was found in *S. plana* from other localities in Essex, Devon, Wales and Suffolk; this suggests that *P. subtenius* is a recent introduction, arriving possibly by the introduction of a normal fish host or, more probably, of the first intermediary. A brief account is given of some aspects of the environmental conditions of a parasite within the lamellibranch kidney; the osmotic pressure of the kidney fluid which surrounds the trematodes was shown to vary with changes in external salinity. The possibility that *Petricola pholadiformis*, a lamellibranch recently introduced from the east coast of North America, is the first intermediary is being investigated and it is suggested that *Proctoeces subtenius* in the Thames estuary shows an abbreviated life-cycle restricted to invertebrate hosts. *P. magnorus* and *P. erythraeus* are regarded as synonyms of *P. subtenius*; the differences between *P. insolitus* and *P. maculatus*, and *P. subtenius* require reinvestigation. *P. macrovitellus* Winter, 1954 does not belong in this genus. There is a list of definitive hosts. S.W.

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- a. GOODCHILD, C. G., 1958.—“Transfaunation and repair of damage in the rat tapeworm, *Hymenolepis diminuta*.” 44 (4), 345–351.
- b. GOODCHILD, C. G., 1958.—“Growth and maturation of the cestode *Hymenolepis diminuta* in bileless hosts.” 44 (4), 352–362.

(247a) Goodchild has shown that adult *Hymenolepis diminuta*, obtained from rats or hamsters, can be successfully implanted surgically into the small intestine of other rats. Tapeworms implanted into the large intestine died. Regardless of the site of implantation in the small intestine the tapeworms succeeded in moving to their normal position. Growth was rapid; reproductive structure and behaviour was normal. In a further series of experiments the tapeworms were mutilated in various ways before implantation in order to test their powers of repair and regeneration. Cuticular repair of the scolex was rapid but excised suckers were not regenerated. Cestodes with one or two suckers removed, survived, migrated and developed morphologically normal strobilae in the intestine. Removal of three suckers or complete ablation of the scolex caused the loss of the worms. S.W.

(247b) Goodchild has studied the growth and development of *Hymenolepis diminuta* in the absence of bile in the rat host. Details of the techniques involved are given. Cysticercoids did not develop in rats in which the bile-duct was cannulated and drained freely to the outside. Nine anterior pieces (including scolex) of adult cestodes were introduced into rats with the bile draining into latex bags; five tapeworms were recovered at autopsy but they had decreased in size and were morphologically and functionally abnormal. When the bile-duct was cannulated to the vas deferens, implanted anterior fragments degenerated and from 21 infective cysticercoids only two stunted and atypical cestodes developed. Cannulation of bile to caecum appeared to be the most promising; of six tapeworms implanted into two hosts, three were recovered at autopsy, all morphologically and functionally abnormal; cysticercoids, however, did not develop. When the bile-duct was ligated and transected cysticercoids did not develop but 13 tapeworms, all atypical, were recovered from 23 implants. Rats in which the bile was cannulated to the caecum and the diet was supplemented with (i) dried ox bile, (ii) sodium glycocholate, (iii) sodium taurocholate or (iv) alkalis were used as controls and it is concluded that bile contains one or more factors essential for normal growth and maturation of *H. diminuta*. There was no correlation between weight loss in the rat and the size and appearance of the cestodes recovered. S.W.

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- c. GOLDBERG, E., 1958.—“The glycolytic pathway in *Trichinella spiralis* larvae.” 44 (4), 363–370.
- d. HOFFMAN, G. L. & HOYME, J. B., 1958.—“The experimental histopathology of the ‘tumor’ on the brain of the stickleback caused by *Diplostomum baeri eucaliae* Hoffman and Hundley, 1957 (Trematoda: Strigeoidea).” 44 (4), 374–378.
- e. LEIGH, W. H., 1958.—“The life-history of *Macroderoides spiniferus* Pearse, 1924, a trematode of the Florida spotted gar, *Lepisosteus platyrhincus*.” 44 (4), 379–387.
- f. JAIN, S. L., 1958.—“Monogenea of Indian fresh-water fishes. VII. *Bifurcohaptor*, a new genus of fresh-water Tetraonchinae from the gill filaments of two fishes from Lucknow.” 44 (4), 388–394.

(247c) Goldberg demonstrated the presence of the following enzymes in homogenates of *Trichinella spiralis* larvae: hexokinase, phosphofructokinase, aldolase, α -glycerophosphate dehydrogenase, glyceraldehyde-3-phosphate dehydrogenase, enolase and lactic dehydrogenase. On this and other evidence Goldberg postulated the presence of an Embden-Myerhof glycolytic reaction sequence. W.P.R.

(247d) In this study Hoffman & Hoyme infected *Eucalia inconstans* with cercariae of *Diplostomum baeri eucaliae* and sectioned them at various intervals, from 15 to 35 minutes after infection to 50 to 60 days. The data indicate that the cercariae penetrate the skin, particularly in the gill region, migrate through the subcutaneous tissue and muscle and, some at least, enter the blood vessels to travel to the brain. A small number appear to enter the brain directly. Eventually they migrate to the choroid plexus at the postero-lateral aspect of the optic lobes and where the space between the brain and cranium allows growth of the “tumour”. The choroid plexus becomes hyperplastic and the “tumour” consists of a substantial amount of columnar epithelium with cells believed to be macrophages surrounding the trematodes. Many worms become localized in the inner part of the optic lobes where considerable brain tissue is resorbed, the ependyma becomes hyperplastic and macrophages accumulate. S.W.

(247e) Leigh has completed experimentally the life-history of *Macroderoides spiniferus*. Eggs, although embryonated and infective when laid, do not hatch until they have been ingested by the first intermediary, *Helisoma duryi*. Daughter sporocysts occur behind the stomach and may replace part of the liver tissue; as long as 11 months after infection they vary greatly in size and in the number of contained cercariae; pigment granules, believed to be a waste product of the trematode, accumulate in the paletot layer. The cercariae belong to the *armata* group of xiphidiocercariae; they emerge from the snail after dark and are weak swimmers; the first cercariae were shed within 30 days of infection at summer temperatures. The metacercariae encyst in the muscles of several small fish, the commonest being *Gambusia affinis holbrooki*, and also in tadpoles; they become infective in 14 days and become sexually mature in the small intestine of *Lepisosteus platyrhincus* ten to twelve days after being eaten. The stages in development are described and the biology of the parasite discussed. S.W.

(247f) Jain describes and figures *Bifurcohaptor* n.g., based on two new species, *B. indicus* (genotype) and *B. giganticus* from the gills of *Mystus vittatus* and *M. seenghala* respectively. The chief distinguishing features of the genus are the deeply forcipate haptor, the very large dorsal anchors which are 8 to 20 times the size of the ventral anchors, the presence of three plates on the bases of the dorsal anchors and the presence of three bars in the haptor. *B. giganticus* may be differentiated from *B. indicus* by the size (it is believed to be the largest fresh-water tetraonchid known—3.25 to 3.76 mm. long), the presence of three sharp cuticular spines on the points of each dorsal anchor, the ratio of size of dorsal to ventral anchor (20:1 compared with 8 to 9:1 in *B. indicus*), and the morphology of the copulatory complex. S.W.

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- g. HOPKINS, S. H. & SPARKS, A. K., 1958.—“A new species of *Bucephaloides* (Trematoda: Bucephalidae) from a marine fish of Grand Isle, Louisiana.” **44** (4), 409–411.
- h. BEVERLEY-BURTON, M., 1958.—“A new notocotylid trematode, *Uniserialis gippyensis* gen. et sp. nov., from the mallard, *Anas platyrhynchos platyrhynchos* L.” **44** (4), 412–415.
- i. HOFFMAN, G. L., 1958.—“Studies on the life-cycle of *Ornithodiplostomum ptychocheilus* (Faust) (Trematoda: Strigeoidea) and the ‘self cure’ of infected fish.” **44** (4), 416–421.
- j. GRUNDMANN, A. W., 1958.—“Cestodes of mammals from the Great Salt Lake Desert region of Utah.” **44** (4), 425–429.

(247g) Hopkins & Sparks describe and illustrate *Bucephaloides bennetti* n.sp. from *Paralichthys lethostigmus*. This trematode was originally described in an unpublished thesis by Melugin in 1940 as *Bucephalopsis bennetti*; in the published abstract it was designated by name only and was listed by Manter in 1954 as a nomen nudum. It is differentiated from *Bucephaloides ovatus* by having a shorter intestine and by having the vitellaria more compactly arranged and not extending so far posteriorly. S.W.

(247h) *Uniserialis gippyensis* n.g., n.sp. is described and figured; the new genus is based on 49 specimens recovered from the intestinal caeca and bursae Fabricii of three mallards in Suffolk, England. It shows affinities with other members of the Notocotylidae, especially the Notocotylinae and bears a superficial resemblance to *Notocotylus skrjabini* but differs from it in having a single median longitudinal row of sessile ventral glands, the position of the common genital pore which is ventral, median, anterior to the intestinal bifurcation and near the oral sucker, and the relative measurements of the cirrus sac and metraterm. S.W.

(247i) Hoffman fed newly hatched chicks with metacercariae of *Ornithodiplostomum ptychocheilus* obtained from naturally infected *Notropis cornutus frontalis*, *N. d. dorsalis*, *Semotilus a. atromaculatus*, *Pimephales p. promelas* and *Boleosoma n. nigrum*. Ovigerous adults were recovered two to five days later. Of three snails exposed to miracidia, *Physa anatina* became infected and shed cercariae 45 days after exposure. The mother and daughter sporocysts and the cercariae are described. The cercaria is almost identical with that of *Posthodiplostomum minimum centrarchi*. Experimental infections of *Pimephales p. promelas*, *N. d. dorsalis* and *S. a. atromaculatus* with cercariae were successful and the development of the metacercaria and cyst and the histopathology of the fish are described. The “self-cure” of the fish, in which bursting of the body wall results in the release of the metacercariae and the healing of these wounds, is discussed. S.W.

(247j) In this survey Grundmann records three species of cestode larvae, six species of adults and eight species of which both larva and adult were recovered. *Lepus californicus deserticola* harboured adults of *Cittotaenia pectinata americana* and *Raillietina retracilis* and larvae of *Hydatigera macrocystis*, *H. laticollis*, *Multiceps serialis*, *Taenia pisiformis* and *T. hydatigena*. *Citellus l. leucurus* was infected with adult *Hymenolepis citelli* and larval *T. rileyi* and *T. hydatigena*. Adults of *Raillietina* sp. and larvae of *T. rileyi*, *Paruterina candelabraria* and *T. hydatigena* were found in *Neotoma l. lepida*. *Peromyscus maniculatus sonoriensis*, the most widely distributed and abundant rodent, was an intermediate host of *Mesocestoides carnivoricolus* and definitive host of *Catenotaenia linsdalei*. *Taxidea taxus taxus*, *Canis latrans lestes* and *Lynx rufus pallescens* carried adult *M. carnivoricolus*; *C. latrans lestes* also harboured adult *Multiceps serialis* and *T. pisiformis*, and *L. rufus pallescens* adult *Hydatigera macrocystis*. *Erithizon dorsatum epizanthum* was infected with adult *Monococcestus americana* and *M. variabilis*. *Perognathus formosus incolatus* harboured adult *Catenotaenia linsdalei*, *Onychomys leucogaster utahensis* adult *Hymenolepis* sp., *Odocoileus h. hemionus* adult *Thysanosoma actinoides*, *Peromyscus crinitus pergracilis* larval *Mesocestoides carnivoricolus*, and the Ord kangaroo rat adult *R. retracilis*. The distribution, ecology and significance of the various rodents in the food chains of the carnivores are discussed. S.W.

247—Journal of Parasitology (cont.)

- k. DRUDGE, J. H., LELAND, Jr., S. E., WYANT, Z. N. & RUST, J. W., 1958.—“Winter survival of some cattle parasites on a Kentucky pasture with observations on the effects of low-level phenothiazine treatment.” **44** (4), 434–438.
- l. MACPHERSON, M., 1958.—“Failure of the excretory ducts of a tapeworm (*Hymenolepis diminuta*) to transport absorbed substances from one portion of the worm to another.” **44** (4), 438.
- m. GAMBINO, J. J., 1958.—“*Cyrtosomum readi* n.sp. and *Cyrtosomum heynemani* n.sp. (Oxyuroidea: Atractidae) two new pinworms of iguanids.” **44** (4), 439–443, 444–445.
- n. HEYNEMAN, D., WELSH, J. F. & VOGEL, M., 1958.—“Infectivity of excysted cysticercoids of *Hymenolepis nana*.” **44** (4), 443.
- o. SINGH, K. S., 1958.—“*Hymenolepis bahli* n.sp. from grey musk shrew, *Crocidura caerulea* (Kerr, 1792) Peters, 1870 from India.” **44** (4), 446–448.

(247k) Drudge *et al.* record observations over four winters averaging seven months in length on the survival of helminth parasites of cattle. *Ostertagia ostertagi*, *Nematodirus helvetianus*, *Cooperia oncophora*, *C. punctata*, *Trichuris* sp. and *Moniezia* sp. survived the winter months on bluegrass pasture in central Kentucky, the two first-named, in particular, being characterized by a high level of resistance to cold weather. There was no evidence that *Haemonchus* sp. and *Oesophagostomum radiatum* over-wintered on pasture. Low-level phenothiazine medication (2 gm. daily) during the intervening summer grazing seasons resulted in the complete elimination of *O. ostertagi* and marked reduction in the numbers of *C. oncophora*; but the numbers of *N. helvetianus* increased during this treatment. No activity of the drug against *Trichuris* sp. was evident; while the numbers of *C. punctata* and *Moniezia* were too small for an evaluation. J.M.W.

(247l) Adult *Hymenolepis diminuta* were placed on agar with about one tenth of the anterior end immersed in isotonic solutions to which P³² phosphate, S³⁵-labelled methionine or Ca⁴⁵ chloride had been added. They were then covered with melted agar and, after this had set, placed in a water bath at 38°C. After periods of from 45 minutes to four or five hours they were washed and examined for radio-activity. All showed uptake in the immersed portions but there was no evidence of transportation via the excretory ducts. S.W.

(247m) Gambino tabulates the iguanids (totalling several hundred and belonging to 17 genera) which he has examined together with the number infected with pinworms and the species of *Cyrtosomum* found. The generic diagnosis of *Cyrtosomum* is emended and two new species are described and illustrated. 20 specimens (10 male and 10 female) of each were studied. *C. readi* n.sp. is a parasite of *Gambelia wislizenii silus* and may be distinguished from all other members of the genus by the great difference in length between the right and left spicules. *C. heynemani* n.sp. from *Holbrookia maculata* is much larger than other species of *Cyrtosomum* and the ratio of the right to the left spicule and the absolute size of the left spicule are different. Both new species are also differentiated from *C. scelopori* in the number and arrangement of the cephalic and caudal papillae. S.W.

(247n) Heyneman *et al.* describe experiments in which they attempted to remove the membranes of normally developed larvae of *Hymenolepis nana* by digestion and tested the infectivity of the freed scoleces in parasite-free white mice. Their results indicate that the membranes which envelop the cysticercoids of *H. nana* are not essential for protection against the digestive enzymes of the final host. S.W.

(247o) Singh describes and illustrates *Hymenolepis bahli* n.sp. The new species is based on two specimens from *Crocidura caerulea*. *H. jacobsoni*, *H. petrodromi*, *H. scutigera*, *H. singularis*, *H. parvissima*, *H. sphenomorphus*, *H. blarinae*, *H. parva*, *H. virilis* and *H. longi* are all closely related to the new form which is differentiated from them by various morphological characters. S.W.

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- p. VELASQUEZ, C. C., 1958.—“*Transversotrema laruei*, a new trematode of Philippine fish (Digenea: Transversotrematidae).” **44** (4), 449–451.
- q. CHAN, K. F. & KOPILOF, S., 1958.—“The susceptibility of two strains of white mice to *Syphacia obvelata* infections.” **44** (4), 451–452.
- †r. NOBLE, E. R., 1958.—“A preliminary report on an ecological study of a fish and its parasites.” **44** (4, Sect. 2), 12.
- †s. RUSSELL, Jr., H. T., 1958.—“A review of the genus *Parorchis*.” **44** (4, Sect. 2), 12.
- †t. KINGSTON, N., 1958.—“Preliminary report on the life histories of a liver- and a kidney-fluke from the ruffed grouse in Algonquin Park, Ontario.” **44** (4, Sect. 2), 12–13.
- †u. HARGIS, Jr., W. J., 1958.—“Homologies of the clamp sclerites of *Chimaericola leptogaster* (Leuckart, 1830) Brinkmann, 1942 (Chimaericoloidea: Monogenea) and related gill parasites of holocephalan fishes.” **44** (4, Sect. 2), 13.

(247p) *Transversotrema laruei* n.sp., of which three metacercariae were collected from *Lates calcarifer* from Rizal Province in the Philippines, has the characteristics of a fully developed worm except for the absence of eggs in the uterus. It resembles *Cercaria koliensis*. *T. laruei* is differentiated from *T. haasi*, the only adult of the genus so far described, by its smaller size, different body shape and arrangement of the vitellaria, the relative proportions of pharynx and acetabulum and the shape of the spines. S.W.

(247q) Experiments with mice from two different colonies suggested that strains vary in their resistance to *Syphacia obvelata*. Nematode-free animals from the Columbia University colony and the Carworth Farms colony were infected by stomach-tube with embryonated eggs at three-day intervals. At autopsy, three days after the last dose of eggs, significant differences were observed principally among the nine-day-old female worms, which averaged 32.2 and 52.3 against 9.5 and 8.8 per host individual in two different experiments. It was deduced that fewer female worms reach maturity in resistant strains of mice. *S. obvelata* females appeared to mature less readily in female than in male mice. J.M.W.

(247r) Noble is studying *Gillichthys mirabilis* and its parasites as an ecological unit over a period of three years, of which the first has been completed. The common helminth parasites include *Gyrodactylus* sp., *Hysteroleitha* sp. and *Spirocamallanus* sp. Some tentative conclusions are given. J.M.W.

(247s) Russell outlines the history of the seven species of *Parorchis* which have been described. From an examination of 88 specimens from five host species (*Catartophurus semipalmatus*, *Totanus melanoleucus*, *Erolia minutilla*, *E. alpina* and *Limnosa fedoa*), he concludes that there are no taxonomically valid differences between the species of *Parorchis* and that only one, *P. pittacium* (Braun) is valid. S.W.

(247t) *Brachylecithum* sp. (of which a description as a new species will appear elsewhere) from the bile-ducts of *Bonasa umbellus* will develop in *Zonitoides arboreus*, *Cionella lubrica*, *Deroceas reticulatum* and *D. laeve*; cercariae are liberated in slime balls five to seven months after the infective feed; the existence of a second intermediary is being investigated. *Tanaisia zarudnyi* from the urinary tubules of *B. umbellus* will develop in *Succinea ovalis* and *Anguispira alternata*, encysted cercariae being found in the snail tissues at 2½ months. S.W.

(247u) Hargis, having examined the clamps of five specimens of *Chimaericola leptogaster*, concludes that the abbreviated sclerite condition is primitive. Detailed examination of the centre piece reveals extreme similarity to the sucker-hooks of *Dicyclobothrium* and these structures may, in fact, be homologous. Thus the probable phylogenetic connection between Hexabothriidae, Chimaericolidae and Diclidophoridae is supported. S.W.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.

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- †v. BYRD, E. E., 1958.—“Observations on the penetration of the snail host by the miracidium of the ochetosomatid trematodes.” **44** (4, Sect. 2), 13.
- †w. ULMER, M. J., 1958.—“Schistosoma dermatitis at Lake Okoboji, Iowa.” **44** (4, Sect. 2), 13-14.
- †x. HSÜ, S. Y. LI & HSÜ, H. F., 1958.—“On the virulence of different geographic strains of *Schistosoma japonicum*.” **44** (4, Sect. 2), 14.
- †y. LUTTERMOSER, G. W., 1958.—“Further study on the enhancement of the *in vivo* schistosomicidal activity of antimony compounds by glycerol.” **44** (4, Sect. 2), 14.
- †z. MUELLER, J. F., 1958.—“In vitro cultivation of the sparganum of *Spirometra mansonoides* to the infective stage.” **44** (4, Sect. 2), 14-15.

(247v) Ochetosomatid miracidia hatch in the gut of the physid snail intermediaries; they swim sluggishly, by means of their cilia, in the gut contents until they are in contact with the mucosal lining. When penetration commences the ciliated epidermal plates are loosened and remain wedged in the opening through which the miracidium slips. In the mucosa the miracidium comes to lie as a thin-walled, sacculated body against the muscularis layer; 24 to 48 hours are required for penetration into the adjacent lymph spaces where the mother sporocyst develops into an elongated sac filled with large germ cells. No sporocyst was followed beyond the 96th hour of development. S.W.

(247w) Ulmer reports on an investigation of outbreaks of schistosome dermatitis at Lake Okoboji in north-western Iowa. The causative organism appears to be a cercaria of the ocellata group which is found in *Physa sayii*. The cercaria resembles that of *Trichobilharzia physellae* (Talbot), *Cercaria epsilon* Brooks, 1948 and the cercaria of *T. camerani* Wu but differs from them in body measurements. The author notes the low incidence of parasites in areas where severe dermatitis occurs. P.K.

(247x) Hsü & Hsü report that Chinese, Formosan, Japanese and Philippine strains of *Schistosoma japonicum* were used to infect 36 albino mice. The animals received 50 male and 50 female cercariae. The time between infection and death of the host was recorded in order to compare the survival potential of the different strains. [No results were given in this authors' abstract.] N.J.

(247y) Enhancement of drug effect was observed when mice, experimentally infected with *Schistosoma mansoni*, were treated with tartar emetic/glycerol or stibophen/glycerol as compared with aqueous solutions of these antimonials. While the use of at least 25% glycerol solutions of the drug increased activity, the toxic properties of the antimonials were not affected. It was suggested that the greater stability of tartar emetic in glycerin may prolong the blood level of the drug. Drug activity *in vitro* was not enhanced by the inclusion of 10% glycerol in the medium. O.D.S.

(247z) Large spargana from mice were maintained in Mixture 199 [composition not stated] plus 10% calf serum up to 11 months. Addition of chick embryo extract had little effect on young spargana but caused rapid outgrowth attenuation of the scolex and death in older specimens. Proceroids from copepods grew from 0.15 mm. to approximately 7 mm. after 60 days in a mixture containing four parts Mixture 199 and 10% calf serum and one part chick embryo extract. Attempts to infect kittens were inconclusive. Sparganules from mice when placed in the same medium, grew at a similar rate and after 60 days were capable of infecting cats. It is concluded that spargana capable of maturing in the cat can be raised in such media without passage through a second intermediate host. J.E.D.K.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24-27, 1958.

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- †ba. MUELLER, J. F., TEPPERMAN, J. & TENER, R. Q., 1958.—“Influence of host nutritional level on the growth rate of *Sparganum mansonoides*.” **44** (4, Sect. 2), 15.
- †bb. OGREN, R. E., 1958.—“The body, hooks and parenchyma of a dilepidid oncosphere.” **44** (4, Sect. 2), 15.
- †bc. HOLMES, J. C., 1958.—“Growth of the spiny-headed worm, *Moniliformis dubius*, and the rat tapeworm, *Hymenolepis diminuta*, in concurrent infections in rats.” **44** (4, Sect. 2), 15.
- †bd. WEINMANN, C. J., 1958.—“Rate of development of acquired immunity in mice to egg infections with *Hymenolepis nana* var. *fraterna*.” **44** (4, Sect. 2), 16.
- †be. WEINMANN, C. J., 1958.—“Egg-production by *Hymenolepis nana* var. *fraterna* and egg infectivity after passage from mice with light, moderate, and heavy worm burdens.” **44** (4, Sect. 2), 16.
- †bf. VOGEL, M., 1958.—“Sensitivity of developing *Hymenolepis diminuta* larvae to high temperature stress.” **44** (4, Sect. 2), 16.

(247ba) Heads of 26 spargana of similar size were injected into 26 mice. 13 mice were maintained on a full diet and the other 13 had their diet reduced to half the calculated normal intake. The mice were killed after six weeks. During this time the spargana in both groups grew at a rate of approximately 2 mm. per day. The wet weight, dry weight and nitrogen content of the worms in the two groups did not differ significantly. It is concluded that the growth rate of the parasites was not retarded by underfeeding the host. J.E.D.K.

(247bb) Ogren reports on the body, hooks and parenchyma of a dilepidid oncosphere. In the morula of *Dilepis undula* it was found that hooks developed in oncoblasts and the medullary contractile centre developed from a binucleate primordium. It is suggested that cortical and medullary contractile centres are antagonistic. N.J.

(247bc) Holmes deals with single and concurrent infections of *Moniliformis dubius* and *Hymenolepis diminuta* in rats. Growth and distribution of the worms in the intestine were studied in infections lasting up to two months. Growth in both worms, and in single and double infections, is initially rapid, becoming less rapid after three to four weeks. In double infections growth of both *Hymenolepis* and *Moniliformis* is retarded. In single and double infections both species become established initially near the middle of the intestine, later moving anteriorly to their normal position, *Hymenolepis* in the anterior fifth and *Moniliformis* in the anterior third of the intestine. I.C.W.

(247bd) Weinmann reports on the rate of development of acquired immunity in mice to infection *per os* with eggs of *Hymenolepis nana* var. *fraterna*. 400 Heston C₃H mice developed different degrees of resistance in correlation with the dosages of infective eggs used to induce immunization. Signs of increased resistance were seen within 12 hours of a sufficiently intense immunization and within 48 to 72 hours of a light immunization. Between the third and the sixth days mice developed a strong, if not absolute, immunity to reinfection, even with the lightest immunizing doses. N.J.

(247be) Weinmann reports on egg production by *Hymenolepis nana* var. *fraterna* and egg infectivity after passage from mice with light, moderate and heavy worm burdens. He found that the variation in worm burden did not affect the infectivity of the eggs but that the production of eggs is almost in inverse proportion to the worm burden. N.J.

(247bf) Vogel investigated the sensibility of developing *Hymenolepis diminuta* larvae to high temperature stress by exposing them while growing in *Tribolium confusum* to 38.5° or 40°C. for 24 hours or longer. The most sensitive period is that of maximal structural differentiation, the effect before or after that period being minimal. Exposure during the sensitive period results in failure of scolex withdrawal and in loss of infectivity of the structurally normal larva. Exposure had no effect on fully developed cysticercoids. N.J.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24-27, 1958.

247—Journal of Parasitology (cont.)

- †bg. MUELLER, J. F., 1958.—“A system for the laboratory propagation of *Spirometra mansonoides*.” **44** (4, Sect. 2), 16–17.
- †bh. SADUN, E. H., WALTON, B. C. & YAMAKI, A., 1958.—“The use of purified antigens in the immunodiagnosis of schistosomiasis.” **44** (4, Sect. 2), 17.
- †bi. SADUN, E. H., BUCK, A. A. & WALTON, B. C., 1958.—“The use of purified antigens in the immunodiagnosis of paragonimiasis in humans and experimental animals.” **44** (4, Sect. 2), 17.
- †bj. YOKOGAWA, M., 1958.—“On a new first intermediate host, *Paludinella devilis* (Gould, 1861) Habe, 1942, of *Paragonimus ohirai* Miyazaki, 1939.” **44** (4, Sect. 2), 17–18.
- †bk. YOKOGAWA, M., 1958.—“Immunological reactions in paragonimiasis.” **44** (4, Sect. 2), 18.

(247bg) *Spirometra mansonoides* has been successfully maintained in quantity in the laboratory through copepods, mice and cats. Fatal infections have been obtained in mice with 500 or more spargana and chronic infections with 150 or less. Infection with adult worms can be maintained in cats for at least two years. Previous or concurrent infection with *Taenia taeniaeformis* confers strong immunity to *Spirometra*. No *proliferum* forms have been observed. Proceroids may be infective to mice on the seventh day of development in the copepod, and sparganules are infective to cats on or before the 12th day of development in the mouse. J.E.D.K.

(247bh) Sadun *et al.* examined ether extracts, purified acid-soluble and acid-insoluble protein extracts of adult *Schistosoma japonicum* by intradermal tests on 206 patients. Of those with schistosomiasis, 95% to 99% gave positive reactions. No trematode-free person gave a reaction but occasionally cross-reactions were observed in patients with clonorchiasis and paragonimiasis. The acid-insoluble protein antigen gave positive complement fixation reactions with sera from rabbits which had been inoculated with cercariae of *S. japonicum* 30 days previously. No cross reactions were obtained. W.P.R.

(247bi) A purified acid-soluble protein fraction from *Paragonimus westermani* was found to give positive reactions in intradermal tests in all persons who were known to be infected, but only one in 121 trematode-free controls reacted. In complement fixation tests, using sera from cats inoculated with a single dose of metacercariae, a purified acid-insoluble, alkali-soluble protein fraction gave the best results. Complement fixation and intradermal tests were compared in 162 patients; 9% of the infected patients gave negative results with complement fixation. No patient who gave a negative intradermal reaction gave a positive complement fixation reaction. No cross-reactions were noted in complement fixation tests with patients with a variety of other parasitic diseases. W.P.R.

(247bj) Yokogawa reports the finding of natural infections of *Paragonimus ohirai* in the snail *Paludinella devilis* in the Shimoda district, Shizuoka Prefecture, Japan. Four out of 6,082 specimens of this species were found infected but no infections were found in 14,167 specimens of the related *Assiminea japonica* previously reported as an experimental host. When exposed to artificial infection cercariae developed in 10 out of 30 *P. devilis* but not in any of the 33 *A. japonica*. C.W.

(247bk) Using the same antigen prepared from adult *Paragonimus westermani*, Yokogawa compared intradermal tests with complement fixation tests in 33,000 patients with and without infection and also in one patient before and after a lobular resection of a helminthic cyst from the right lung. The author concluded: (i) the intradermal test would be of value for screening patients for paragonimiasis; (ii) complement fixation tests should be used where positive skin tests are obtained; (iii) the complement fixation test is of value for the diagnosis of extra-pulmonary infections and for the evaluation of treatment. W.P.R.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.

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- †bl. PENNER, L. R., 1958.—“The use of naked snails in the study of larval trematode infections.” **44** (4, Sect. 2), 18–19.
- †bm. NODA, K., 1958.—“Observation on *Melania muiensis* as intermediate host of *Stellantchasmus falcatus* in Hawaii.” **44** (4, Sect. 2), 19.
- †bn. McNEIL, C. W. & WALTER, W. M., 1958.—“Preliminary winter survival studies 1956–1957, 1957–1958 on *Stagnicola palustris nuttalliana* (Lea, 1841) and *Physa propinqua* Tryon, 1865.” **44** (4, Sect. 2), 19.
- †bo. COLEMAN, R. M., 1958.—“Comparative vitamin studies on *Helisoma trivolvis* and *Littorina littorea*.” **44** (4, Sect. 2), 19–20.
- †bp. CIORDIA, H. & BIZZELL, W. E., 1958.—“Relation of *Escherichia coli* to the development of the preparasitic stages of various cattle nematodes.” **44** (4, Sect. 2), 25.
- †bq. LESSER, E. & SQUIERS, C. D., 1958.—“Parasites in a selected group of swine in Alabama.” **44** (4, Sect. 2), 25.

(247bl) Penner observed the survival of a specimen of *Nassarius obsoletus* which had left its shell and this led to experiments in the use of snails from which the shells had been removed mechanically for observations on cercarial emergence. Cercariae of *Ornithobilharzia canaliculata* were found to emerge singly from *Batillaria minima*. *Nassarius obsoletus* without shells appear to survive longer when infected with *Cercariaeum lintoni* than when uninfected. There is also evidence that this infection results in reduced penis size in the host, an effect not observed in infections of *C. variglandis*. C.W.

(247bm) Noda has carried out life-history studies on the heterophyid trematode *Stellantchasmus falcatus* in Hawaii. During the course of this work collections of *Melania muiensis* and *M. indefinata* were made from a brackish pool where the majority of mullet were infected with the metacercariae of *S. falcatus*. 12.3% of 398 *M. muiensis* were found to shed pleurolophocercous cercariae, proved later to be those of *S. falcatus*, while no cercariae were obtained from the less common *M. indefinata*. C.W.

(247bn) McNeil & Walter have made some preliminary observations on the survival of two snails, *Stagnicola palustris nuttalliana* and *Physa propinqua* during two successive winters in Washington. After the colder of the two periods the lymnaeid snail showed significantly higher survival than the *Physa*, both in the field and under experimental conditions, while in the milder winter which followed the survival rates of both species were more closely similar. C.W.

(247bo) Coleman has compared the content of ascorbic acid, niacin, thiamine and biotin in extracts of whole specimens of *Helisoma trivolvis* and *Littorina littorea*. The first three vitamins were found in both species, the first two were present in greater concentration in *Littorina* than in *Helisoma* but differences in thiamine were not significant. A trace of biotin was found only in *Littorina*. C.W.

(247bp) Ciordia & Bizzell added *Escherichia coli* tagged with P³² to faecal cultures of the cattle nematodes *Cooperia oncophora*, *Ostertagia ostertagi* and *Trichostrongylus axei*. The resulting infecting larvae did not show any radio-activity, which did not confirm, as was expected, the hypothesis that pre-infective larvae fed on the bacteria. Further experiments on the nutritive requirements of these pre-infective larvae are outlined; and yet further work is said to be in progress. N.J.

(247bq) Lesser & Squiers determined the intestinal parasites of 19 sows and found 100% infected with *Hyostrogylus* and/or *Oesophagostomum* spp., 31.6% with *Ascaris suum*, 31.6% with *Strongyloides ransomi*, one individual with *Gongylonema pulchrum* and one with lungworm. After farrowing the 19 individual litters were examined. 79.0% of them were found infected with *S. ransomi* and one litter with *A. suum*. After weaning the pigs were kept in groups of six in concrete pens for four months and during this period 75.0% were infected with *A. suum*, 43.8% with *S. ransomi*, 21.0% with *Hyostrogylus* and/or *Oesophagostomum* spp. and 15.8% with *Trichuris suis*. None showed signs of clinical parasitism. J.M.W.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.

247—Journal of Parasitology (cont.)

- †br. LEVINE, N. D., BRADLEY, R. E. & MACK, R. M., 1958.—“The relation of two weekly pasture rotation systems to the acquisition of gastrointestinal nematodes by sheep.” **44** (4, Sect. 2), 25–26.
- †bs. ALLEN, R. W., SCHAD, G. A. & SAMSON, K. S., 1958.—“Experimental cross-transmission of two strains of *Haemonchus* from wild ruminants to domestic sheep, with observations on their pathogenicity as compared with *Haemonchus* from domestic sheep.” **44** (4, Sect. 2), 26.
- †bt. HWANG, J. C. & WEHR, E. E., 1958.—“Observations on early development of *Ascaridia columbae* in the pigeon.” **44** (4, Sect. 2), 26–27.
- †bu. LUND, E. E., 1958.—“Studies on ‘self-cure’ and acquired resistance to *Heterakis* infections in chickens and turkeys.” **44** (4, Sect. 2), 27.

(247br) Levine *et al.* describe small scale experiments in pasture management. One group of eight lambs and six ewes were maintained on the same one-and-a-half acre pasture for 20 weeks. Over the same period ten lambs and eight ewes were placed on one of six quarter-acre plots. They were moved at weekly intervals, visiting each plot in turn throughout the observation period. A third group comprising ten lambs was moved similarly around another set of six plots; their ewes did not accompany them but occupied plots which the lambs had just vacated. The authors concluded that there was no significant difference between the live-weight gains of the groups and, from the study of worm egg counts, that the grazing systems did not prevent the development of heavy worm infections.

H.D.C.

(247bs) Allen *et al.* established what they refer to as “strains” of *Haemonchus* sp. obtained from wild Bighorn sheep (*Ovis canadensis*) and from wild Barbary sheep (*Ovis tragelaphus*). Using worm-free lambs as test animals they compared the effect of infections with these “strains” with the effect of infections of *Haemonchus* obtained from a domestic flock. They concluded that during the 11 weeks of the experiment lambs infected with the “wild strains” gained significantly more weight and maintained higher haemoglobin levels than did lambs infected with larvae derived from the domestic breed. Worm egg counts and worm counts are said to give further evidence of this difference between the wild and domestic “strains”. The measurements of most of the worms recovered were within the range given for *H. placei* [for abstract see Helm. Abs., **23**, No. 222b].

H.D.C.

(247bt) Hwang & Wehr fed embryonated eggs of *Ascaridia columbae* to 14 adult pigeons. Larvae were recovered from the intestine 24 hours later, but not from other organs and tissues. 43 hours after infection larvae appeared in the liver, but were absent in the intestine and other organs examined. A few larvae were recovered from the intestinal tract and the liver 312 hours after infection. 408 hours after infection many larvae were recovered from the intestinal tract. A few, however, were found still in the liver. The authors conclude that passage through the liver may be a normal and necessary part of the life-cycle of *A. columbae* and that the developing larvae do not necessarily penetrate the intestinal wall before they appear in the intestinal lumen.

N.J.

(247bu) Lund fed 200 embryonated eggs of *Heterakis gallinae* to chickens. As a result of re-infection with the same number of eggs four weeks later, the number of 10 to 18-day old larvae was reduced by about 20% as compared with that from the birds that received only the second dose of embryonated eggs. No expulsion of adult worms (from the first infection) was observed however. Two lots of 25 chickens were fed with *Heterakis* eggs carrying a pathological strain of *Histomonas*. One of the two lots had been previously fed an immunizing dose of *Heterakis* eggs alone. As a result, in birds not developing blackhead, the number of larvae resulting from the second feeding was less than half of that from birds not previously immunized. 70% of the latter developed blackhead and the number of worms was high in all birds with histomoniasis. No “self-cure” was observed in this case either. Comparable tests with turkeys gave similar results.

N.J.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.

247—Journal of Parasitology (cont.)

- †bv. SPRENT, J. F. A., 1958.—“The life history and development of *Toxascaris leonina* (von Linstow 1902) in the dog and cat.” **44** (4, Sect. 2), 27.
- †bw. LELAND, Jr., S. E., DRUDGE, J. H. & WYANT, Z. N., 1958.—“Blood and plasma volume, total serum protein, and electrophoretic serum fractionation of calves experimentally infected with *Trichostrongylus axei*.” **44** (4, Sect. 2), 27–28.
- †bx. TURNER, J. H. & SHALKOP, W. T., 1958.—“Larval migration and accompanying pathological changes in experimental ovine strongyloidiasis.” **44** (4, Sect. 2), 28.
- †by. BAILEY, W. S. & RIBELIN, W. E., 1958.—“Observation on the association of esophageal sarcomas with *Spirocerca lupi* infection in the dog.” **44** (4, Sect. 2), 28.

(247bv) Sprent infected dogs and cats with eggs and larvae of feline and canine strains of *Toxascaris leonina* from experimentally infected mice. Second-stage larvae were found in mice seven days after infection. They were recovered from the intestinal wall, intestinal contents and somatic tissues of cats, infected by means of eggs, within 7 to 14 days of infection. The second moult was observed in mouse tissues 8 to 12 days and in cat tissues 7 to 14 days after infection. Third-stage larvae were recovered from mice infected with canine and feline strains 9 and 21 days respectively after infection. The third moult occurred in the intestinal wall of dogs and cats 21 to 35 days after infection. Fourth-stage larvae appeared in the intestinal contents of cats infected by eggs at 21 days, cats infected by means of mice at 18 days and in dogs infected by eggs at 32 days. The fourth moult occurred in a cat infected by means of mice at 35 days, in a cat infected by eggs and a dog infected by eggs at 42 days. Adult *T. leonina* were found at 28 days in a cat infected by eggs and at 38 days in a dog infected by eggs. Eggs were found in the faeces of a cat infected by eggs at 74 days and in a dog infected by means of mice at 56 days.

N.J.

(247bw) Leland *et al.* found that the sera of calves given single doses of 5,000 to 1.5×10^6 larvae of *Trichostrongylus axei* showed an increase in the protein concentration and in the total circulating protein. This was due largely to increases in albumin with decreases in globulins other than α -2-globulin. Polycythaemic hypovolaemia developed, which, if the animal survived, changed into an oligocythaemic hypovolaemia.

W.P.R.

(247bx) Turner & Shalkop discuss the migration of *Strongyloides papillosus* larvae in the host tissues and the pathological changes caused by them. Lambs infected through the skin were used for this experiment. By means of biopsy specimens the presence of larvae in the skin 15 minutes to 48 hours after infection was demonstrated. Slight haemorrhage and oedema were also observed in the skin. At autopsy, the greatest number of larvae was found 12 to 24 hours after infection and more of them were found in the venous than in the arterial blood. No larvae were found in circulating blood after 72 hours. They were recovered from lungs and musculature 12 hours after infection and, three-and-a-half hours later, from the gastro-intestinal tract. Pathological changes in the lungs were observed two days after infection and reached their maximum three days later. These organs were covered with petechiae and ecchymoses. As histological changes, acute hyperaemia, interstitial extravasation of blood and oedema were noted. Severe catarrhal enteritis was usually confined to the duodenum and jejunum.

N.J.

(247by) Bailey & Ribelin report that oesophageal sarcoma (fibrosarcoma or osteosarcoma) was found in 16 dogs approximately six months old. All 16 cases were from a group of 163 animals, which had been infected with *Spirocerca lupi*. Altogether 1,969 dogs were examined.

N.J.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.

247—Journal of Parasitology (cont.)

- †bz. DOUVRES, F. W. & LUCKER, J. T., 1958.—“The morphogenesis of the parasitic stages of the cattle lungworm, *Dictyocaulus viviparus*, in experimentally infected guinea pigs.” **44** (4, Sect. 2), 28–29.
- †ca. KLEWER, H. L., 1958.—“The incidence of helminth lung parasites of *Lynx rufus rufus* (Shreber) and the life cycle of *Anafilaroides rostratus* Gerichter, 1949.” **44** (4, Sect. 2), 29.
- †cb. TROMBA, F. G., 1958.—“Observations on swine experimentally infected with the kidney worm, *Stephanurus dentatus*.” **44** (4, Sect. 2), 29.
- †cc. ROTHSTEIN, N., 1958.—“Vital staining of blood parasites with acridine orange.” **44** (4, Sect. 2), 29–30.
- †cd. ALICATA, J. E., 1958.—“Observations on the development of *Cooperia punctata* of cattle in rabbits.” **44** (4, Sect. 2), 30.

(247bz) Guinea-pigs have been successfully infected with larvae of *Dictyocaulus viviparus*. The infective larvae were first isolated from the faeces of infected calves and single doses of 120,000 to 450,000 were then given orally to guinea-pigs which were killed at intervals from 18 hours to 30 days following infection. Worms were recovered from normal saline washings of macerated lung tissue and the stage of development determined. Larvae in the parasitic third stage, third moult, fourth stage, fourth moult, and immature worms in the fifth stage were recovered at 18, 23, 43½, 144 and 154 hours after infection respectively. K.H.

(247ca) Klewer examined the lungs of 24 bobcats (*Lynx rufus rufus*) in Virginia and found adult *Anafilaroides rostratus* in 23 of them, *Troglostrongylus wilsoni* in 22, *Metathelazia felis* in three, *Metathelazia* sp. (*M. californica*?) in eight, and *Paragonimus rude* in five. Larval development of *A. rostratus* was studied experimentally in the slug *Limax maximus*, which served as intermediate host. Infective larvae were observed by the eleventh day. Adult infections were produced in domestic kittens. Further studies are being carried out to ascertain the possible involvement of a rodent transport host and to determine the pathway of infection in the definitive host. J.M.W.

(247cb) Tromba infected fifteen 13 to 98-day-old pigs with infective larvae of *Stephanurus dentatus*. Six of them received 1,000 to 5,000 larvae by direct administration in a single dose; four animals received multiple doses totalling 1,000 to 1,150 infective larvae and the remaining five pigs were fed approximately 750 larvae contained in *Eisenia foetida*. Eosinophilia was observed two to three weeks after infection in all infected animals. It reached its peak values of 20·5% to 39% within one month of infection, after which it slowly resumed its normal value. 93 to 180 days after infection the pigs infected with 2,000 or more larvae showed loss of weight and lowered haemoglobin values, and four of them died. In one of the animals infected with a single dose, in one given multiple doses and in all five infected with parasitized *E. foetida*, *S. dentatus* eggs were present in the urine and gravid females were found at autopsy 240–342 days after exposure. N.J.

(247cc) [A fuller account appears in *J. Parasit.*, **44**, 588–594. For abstract see No. 247eq below.]

(247cd) Alicata infected orally five four-week-old rabbits with several hundred *Cooperia punctata* larvae from naturally infected young cattle. 14 to 25 adult *C. punctata* were recovered from the small intestine at autopsy one month later. Another group of eight rabbits received 20,000 infective larvae per animal. Two to 16 adult worms were found at post-mortem 16 days after infection. Most of the adult female worms contained unsegmented eggs in the uteri. Some, however, contained eggs at the early cleavage stage. Faecal examination before autopsy was negative. The author concludes that the rabbit is not a very satisfactory host for *C. punctata*. N.J.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.

247—Journal of Parasitology (cont.)

- †ce. DEWHIRST, L. W., TRAUTMAN, R. J. & PISTOR, W. J., 1958.—“Preliminary report on helminths of beef cattle in Arizona.” **44** (4, Sect. 2), 30.
- †cf. ABDEL MALEK, E., 1958.—“Occurrence of *Onchocerca armillata* Railliet and Henry, 1909, in Sudanese cattle, *Bos indicus*.” **44** (4, Sect. 2), 30–31.
- †cg. ABDEL MALEK, E., 1958.—“Life cycle studies on the nematode *Subulura brumpti* (Lopez-Neyra, 1922) Cram, 1926, and its distribution in the Sudan.” **44** (4, Sect. 2), 31.
- †ch. FELDMESSER, J., FEDER, W. A. & REBOIS, R. V., 1958.—“Further effects of altered gas tensions on activity of plant-parasitic nematodes.” **44** (4, Sect. 2), 31.
- †ci. FAIRBAIRN, D., 1958.—“Trehalose and glucose in helminths and other invertebrates.” **44** (4, Sect. 2), 31–32.
- †cj. ROHRBACHER, Jr., G. H., 1958.—“The effect of stilbestrol implants upon the development of *Trichostrongylus axei* and *T. colubriformis* in the laboratory rabbit.” **44** (4, Sect. 2), 32.

(247ce) Dewhirst *et al.* found 94% of faecal samples from Arizona beef cattle positive for helminth eggs. Faecal and post-mortem examination showed that the following parasites were present: *Haemonchus* sp., *Oesophagostomum radiatum*, *Trichostrongylus* sp., *Ostertagia* sp., *Cooperia* sp., *Bunostomum phlebotomum*, *Nematodirus* sp., *Trichuris* sp., *Capillaria* sp., *Setaria cervi*, *Fasciola hepatica* and *Moniezia* sp. Irrigated pasture animals showed the highest faecal egg count and range cattle the lowest. Significant numbers of infective larvae survived the winter on irrigated pastures. J.M.W.

(247cf) Abdel Malek reports on the occurrence of *Onchocerca armillata* in Sudanese cattle, *Bos indicus*. On 18 days over a period of one to two years the author found the infection in 94% of cattle in the White Nile province and in 96% of cattle from Kordofan and Darfur. *Elaeophora poeli*, generically close to *O. armillata*, has not yet been found in cattle, but is believed to be common in buffalo. N.J.

(247cg) Abdel Malek studied the life-history of *Subulura brumpti* using grasshoppers as intermediate hosts and found the morphology of the larvae to be identical with that described by Cuckler & Alicata (1944). The distribution of both *Heterakis gallinae* and *S. brumpti* in the Sudan and Egypt is reported to be governed by ecological and geographical factors, only the *Subulura* sp. occurring in the arid north. W.G.I.

(247ch) The rates of emergence of *Radopholus similis* and *Pratylenchus brachyurus* from feeder roots contained in tap water saturated with air, oxygen and carbon dioxide were determined. After five hours the numbers of nematodes emerging from roots in oxygenated water were about twice those in the air-saturated water and five times those in the presence of carbon dioxide. Significant reductions in the viable nematode populations occurred in the roots exposed to the air-saturated and carbon dioxide-saturated water. H.R.W.

(247ci) [The full account of this paper appears in *Canad. J. Zool.*, **36**, 787–795. For abstract see No. 218a above.]

(247cj) Rohrbacher implanted subcutaneously 12.0 mg. stilboestrol pellets into the cervical region of six California white rabbits. 18 days later these and five control rabbits received orally 3,300 infective larvae of *Trichostrongylus axei* (bovine strain) and 6,600 infective larvae of *T. colubriformis*. No apparent difference in the number of worms recovered at autopsy 30 days after infection was noticed. Infected organs did not present any striking pathological changes. The spleens of the animals treated with stilboestrol, however, were approximately four times the size of those of the control animals. N.J.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.

247—Journal of Parasitology (cont.)

- †ck. CROSS, Jr., J. H., DAWSON, C., SCOTT, J. A. & MACDONALD, E. M., 1958.—“Dilution egg counts of *Nematospiroides dubius* in mice and rats.” 44 (4, Sect. 2), 32.
- †cl. LIU, G. Y. H. & IVEY, M. H., 1958.—“Preliminary studies on *Nematospiroides dubius* (Baylis, 1926).” 44 (4, Sect. 2), 32–33.
- †cm. KRUIDENIER, F. J. & MEHRA, K. N., 1958.—“*Aspiculuris* (Nematoda: Oxyuridae) from the wood rats of the Grand Canyon National Park, Arizona.” 44 (4, Sect. 2), 33.
- †cn. FREEMAN, R. S., 1958.—“On the epizootiology of *Capillaria hepatica* (Bancroft, 1893) in Algonquin Park, Ontario.” 44 (4, Sect. 2), 33.
- †co. HUGGHINS, E. J., 1958.—“Studies on parasites of fishes in South Dakota.” 44 (4, Sect. 2), 33.
- †cp. STABLER, R. M. & SCHMITTNER, S. M., 1958.—“A microfilaria from the Gila monster.” 44 (4, Sect. 2), 33–34.
- †cq. GOLDBERG, E., 1958.—“The extraction and analysis of the nucleic acids of *T. spiralis* larvae.” 44 (4, Sect. 2), 34.

(247ck) Cross *et al.* carried out dilution egg counts of *Nematospiroides dubius* in mice and rats. The latter had been previously treated with cortisone in order to reduce their resistance to this infection. Regular egg counts showed that 16 to 18 days after infection egg production in mice increased rapidly to a level of between 50,000 and 90,000 eggs per day. These levels were maintained, with some fluctuations, for four to five weeks, after which they constantly decreased. Eight months after infection egg production in mice ceased altogether. In rats it ceased two months after infection. No female worms were found at autopsy of mice carried out immediately following the end of the egg production period. Peak egg production in rats treated with cortisone reached 6,000 to 12,000 eggs a day. The number of *N. dubius* eggs per female per day was 1,500 to 1,800 in mice and 320 to 440 in rats. These numbers were calculated from the average of five days' counts and the numbers of females recovered at autopsy shortly after the peak production period. N.J.

(247cl) Liu & Ivey studied the factors concerned with the cultivation, infection and effects of concurrent infection on *Nematospiroides dubius* in mice. *Trichinella spiralis*, *Ancylostoma caninum* and *N. dubius* itself were used as superinfections. The group superinfected with the second of these species showed a drop in egg productivity and a loss in *N. dubius* adults. Neither of the other two showed any effects. Egg viability was not affected. W.G.I.

(247cm) Kruidenier & Mehra report an apparently new species (not named) of *Aspiculuris* from several species of wood rat in the Grand Canyon National Park, Arizona. The hosts are *Neotoma lepida*, *N. stephensi* and *N. cinerea*. No specimens of the parasites are reported from *N. albigula*. W.G.I.

(247cn) Freeman reports that the incidence of infection of *Peromyscus maniculatus* with *Capillaria hepatica* varied directly with the density of population of the host. *C. hepatica* is said to be a common parasite of *P. maniculatus* in Algonquin Park, Ontario and infection occurs chiefly during the winter and early spring. It is suggested that the faeces of carnivores are not the main source of infection; *P. maniculatus* could be infected as a result of cannibalism within its populations. *C. hepatica* eggs would be thus released into overwintering nests, reach the infective stage in late spring and early summer and become a source of infection the following winter. N.J.

(247cp) *Microfilaria stahnkei* n.sp. was found in the blood of *Heloderma s. suspectum*. The measurements of 25 microfilariae stained with Giemsa were: average length 261 μ , range 231–300 μ ; average width 7.4 μ , range 7.0–8.4 μ ; average length of sheath 318 μ , range 245–383 μ . The anterior end was blunt, the posterior end tapering and there were faint striae. On post-mortem examination of the *Heloderma* no adult worms were found. W.A.F.W.

(247cq) Goldberg found that 35–40% of the total phosphorus in larvae of *Trichinella spiralis* was in pentosenucleic acid; 8% occurred in desoxypentosenucleic acid. W.P.R.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.

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- †cr. KATZ, F. F., 1958.—"Observations on the oral transplantation of intestinal stages of *Trichinella spiralis*." 44 (4, Sect. 2), 34.
- †cs. ZIMMERMANN, W. J., HUBBARD, E. D. & MATHEWS, J., 1958.—"Studies on fecal transmission of *Trichinella spiralis*." 44 (4, Sect. 2), 34.
- †ct. OLSEN, O. W. & ROBINSON, H. A., 1958.—"Role of rats and mice in transmitting *Trichinella spiralis* through their feces." 44 (4, Sect. 2), 35.
- †cu. WAGNER, E. D. & BURNETT, H. S., 1958.—"Thelaziasis in California, with a report on reservoir hosts." 44 (4, Sect. 2), 35.
- †cv. HALEY, A. J. & CLIFFORD, C. M., 1958.—"Age and infectivity of the filariform larvae of the rat nematode *Nippostrongylus muris*." 44 (4, Sect. 2), 36.

(247cr) Katz infected "donor" mice with *Trichinella* larvae obtained from muscles of infected rats. Intestinal stages of *T. spiralis* from the donor mice were orally administered to "receptor" mice by means of a syringe and a blunted needle. On examination of the receptor animals, 21 or more days after infection, larvae were recovered from those animals that had received worms inoculated into donor animals 5, 47, 52 and 71 hours before the transplantation. No larvae were recovered from those receptors which were inoculated with worms that stayed in the donors for 24 hours. Larvae were recovered from only half of the receptors inoculated from donors with a 47-hour-old infection. N.J.

(247cs) Zimmermann *et al.* report that fox cubs and albino rats infected with *Trichinella spiralis* were placed in cages above pigs, rats and fox cubs at various time intervals after infection. As a result of this experiment the following factors were found to control faecal transmission of *T. spiralis*: (i) the time interval between infection and placement of donor animals above receptor animals; (ii) the degree of immunity of the donor animal; and (iii) the size of infective dosage. Studies of faeces, using the Baermann technique showed that no apparent loss of infectivity of larvae was caused by their passage through the digestive tract. N.J.

(247ct) Olsen & Robinson report that as a result of feeding, in meat, 300 *Trichinella spiralis* cysts to mice and 1,500 cysts to rats, 4.9% were recovered in the form of cysts and larvae in the faeces of mice and 1.8% in the faeces of rats within 24 hours of infection. The same experiment, repeated with the same animals four weeks later, revealed 10.5% and 16.9% passed in the faeces of mice and rats respectively. Few larvae were found during the first 24 hours after infection. Faeces from the first experiment, when dried for four to eight hours, infected 3.3% of mice and 5% of rats; they produced infections in 6.7% and 10% of mice and rats when kept moist. Dried faeces from mice and rats, after the second meal of trichinous meat, produced infections in 6.7% of mice and 15% of rats. The respective infections were 30% and 45% in the case of moist faeces. All control animals were negative. Moist faeces of mice and rats resulting from the first and second meal of trichinous meat when fed to two young pigs infected both of them. Control pigs remained free from infection. The greatest number of cysts and larvae was found within 24 hours of ingestion of trichinous meat. N.J.

(247cu) Wagner & Burnett report on an eight minute, 16 mm. colour motion film, dealing with the problem of thelaziasis (*Thelazia californiensis*) in deer, dogs, man and other mammals in California. Special attention is given to the reservoir hosts, two of which had not been hitherto reported, namely jack rabbit and domestic silver fox. The film is said to include new evidence on the life-cycle in connection with the new hosts studied. N.J.

(247cv) The infectivity of filariform larvae of *Nippostrongylus muris* from one to eight-and-a-half weeks of age for Sprague-Dawley rats was investigated. Some 50% of larvae from one to four weeks old were infective but after this age a steady decrease in infectivity with increase in age occurred. The oldest larvae averaged as little as 1% infectivity. A decrease in fat content with age was also noted. Larvae from seven to eight-and-a-half weeks old were observed to be shorter, thinner and much less active than younger individuals. K.H.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24-27, 1958.

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- †cw. PARKER, J. C. & HALEY, A. J., 1958.—“Phototactic and thermotactic responses of filariform larvae of the rat nematode *Nippostrongylus muris* (Yokogawa, 1920).” **44** (4, Sect. 2), 36.
- †cx. CHUTE, R. M. & COVALT, D. B., 1958.—“Experimental *Trichinella spiralis* infections in bats.” **44** (4, Sect. 2), 36.
- †cy. CHUTE, R. M. & LEWIS, S., 1958.—“Experimental *Trichinella spiralis* infections in hibernating hamsters.” **44** (4, Sect. 2), 37.
- †cz. OLSON, L. J., 1958.—“The survival of challenging *Litomosoides carinii* larvae in immature and mature white rats as influenced by cortisone.” **44** (4, Sect. 2), 37.
- †da. LYNCH, J. E. & HOEGL, E. E., 1958.—“Some experiences with the use of *Syphacia obvelata* as a test organism for detecting anthelmintic activity.” **44** (4, Sect. 2), 38.

(247cw) The filariform larvae of *Nippostrongylus muris* have been claimed to give positive phototactic and thermotactic responses to stimuli. The authors claim to have demonstrated that the apparent positive phototactic response was in actual fact due to the heat present in the light. The experimental evidence was obtained by measuring the response of larvae when placed on agar plates 4 cm. away from a light spot from a microscope spot lamp. In this experiment 92.8% of the larvae migrated into the area of light. If a water barrier was placed between the lamp and the agar plate then the number migrating into the area of light was reduced to 2.1%. This figure did not differ significantly from the random migrations of unstimulated larvae. When powdered charcoal was mixed with the agar and the water barrier used some 75.5% of the larvae migrated into the light area. K.H.

(247cx) Chute & Covalt report that the infection of three bat species (*Myotis lucifugus*, *M. keenii* and *Pipistrellus subflavus*) with *Trichinella spiralis* larvae did not cause any difference in their mortality as compared with the control bats. 100 *Trichinella* larvae were fed to two groups of six bats. One group was kept at 5°C. and roused from hibernation every two or three days to be fed, living *Tenebrio* larvae being used as food. The other group was kept at 23°C. On the sixth day 17 larvae were recovered from the 23°C. group and seven larvae from the other group. Two other groups, each consisting of ten bats, were infected in a similar way with 500 larvae per animal. One group was kept at 5°C. and the other at 35°C. On the eighth day after infection an average number of ten larval worms was recovered from each animal in the first group and 35 larval or adult worms from each animal in the second group. N.J.

(247cy) Chute & Lewis report on the study of *Trichinella spiralis* from 13 hamsters, each of which was experimentally infected with 500 larvae. Seven out of eight animals kept in a cold room at 5°C. hibernated at least once, while the other five maintained at the temperature of 18°–20°C. remained active. At autopsy, 30 to 50 days after infection the average number of larvae recovered from animals kept in the cold room was 3,580 and that from the other five hamsters was 7,320. The length of the larvae was 0.64 mm. in the case of hibernating and 0.69 mm. in the case of non-hibernating hamsters. It is concluded that host hibernation reduces the number and the size of *T. spiralis* larvae in hamsters. N.J.

(247cz) Olson immunized immature and mature white rats at the age of three and eight weeks respectively against *Litomosoides carinii* by subcutaneous injections of larvae 31 days before autopsy. This resulted in reduced numbers of larvae completing their migration to the pleural cavity, when reinfected 21 days later. On the other hand, the percentage of larvae encapsulated in the pleural cavity increased. These results were most significant in the case of mature rats. Daily cortisone injections in a dose of 30 mg. per kg. suppressed encapsulation of larvae and resistance to their migration in immunized animals to levels noted from similar rats with primary infections. The drug also suppressed cellular response of immunized and control rats to levels observed from uninfected rats. N.J.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.

247—Journal of Parasitology (cont.)

- †db. LYNCH, J. E. & NELSON, B. V., 1958.—“Compound 1871. A new anthelmintic. I. Preliminary studies on the therapeutic activity against *Nematospiroides dubius*.” 44 (4, Sect. 2), 38.
- †dc. WALLACE, W., EMRO, J. & JOHNSON, D. W., 1958.—“Results from a one-year field trial on the effects of N-phenyl-N'-dichloroacetyl piperazine daily in the feed on natural *Ancylostoma caninum* infections in dogs.” 44 (4, Sect. 2), 38.
- †dd. BURROWS, R. B., 1958.—“A new anthelmintic effective against *Ancylostoma caninum*.” 44 (4, Sect. 2), 38.
- †de. McCOWEN, M. C., CALLENDER, M. E., BRANDT, M. C., GOSSETT, F. O., GREGORY, R. P. & SHUMARD, R. F., 1958.—“Dithiazanine iodide, an effective broad-spectrum anthelmintic for small animals.” 44 (4, Sect. 2), 39.
- †df. KANTOR, S., BLIZNICK, A. & KENNETT, Jr., R. L., 1958.—“The anthelmintic activity of piperazine dihydrochloride monohydrate in the chicken's diet against *Ascaridia galli* larvae.” 44 (4, Sect. 2), 39.
- †dg. PEEBLES, C. R. & RIVERA-ANAYA, J. D., 1958.—“Swine nematode control in Puerto Rico.” 44 (4, Sect. 2), 39.
- †dh. MAYHEW, R. L., TORBERT, B. G. & MILLER, G. C., 1958.—“The effects of $\frac{1}{2}$ gram of phenothiazine on the development of infective larvae of *Cooperia punctata* in pure infections in cattle.” 44 (4, Sect. 2), 39-40.

(247db) *Nematospiroides dubius* is considered a suitable organism for screening compounds of potential use against trichostrongylid parasites of economic importance in sheep and cattle. Standard infections of *N. dubius* may be reproduced in mice and this parasite has been shown to be highly resistant to known anthelmintics except when these are given in large multiple doses. Compound 1871 [formula not given] proved efficacious against *N. dubius* and activity based on worm clearance has been demonstrated with doses as low as 12.5 mg. per kg. O.D.S.

(247dc) Field experiments carried on for one year in the treatment of *Ancylostoma caninum* infections in 31 adult Skye terriers by daily addition of 20 mg. per kg. of N-phenyl-N'-dichloroacetyl-piperazine to the dry feed reduced the hookworm egg counts appreciably as compared with those of 40 control dogs to which only intermittent treatment was given during the period of observation. O.D.S.

(247df) When piperazine dihydrochloride monohydrate was added to the feed for one to two weeks in concentrations of 0.26% and 0.13% base from the day of infection of chickens with *Ascaridia galli*, the number of developing larvae was reduced by 90%. Reduction of dose to 0.06% for 14 days from the day of infection reduced larval counts by 70% but dosage at this level for nine or ten days was ineffective. Single-day treatment ten days after infection at 1.53%, 1.02% and 0.80% drug in feed reduced the larvae by 81%, 37% and 48% respectively. O.D.S.

(247dg) After having obtained good results in adult pigs against ascarids and nematodes other than *Trichuris* with a 1 oz. per 100 lb. body-weight dose of piperazine, Peebles & Rivera-Anaya tried the drug on eight five-month-old pigs. As a result of the treatment the number of *Ascaris* eggs per gramme of faeces was reduced from 1,056 to one. The average number of worms expelled was eight. A total dose of 2.5 oz. of cadmium anthranilate given to another group of eight pigs over three days in food reduced the ascarid egg counts from 349 to 127 per gm. of faeces and expelled a single adult worm on the average. In the control group the egg count decreased over the same period from 640 to 585 e.p.g. of faeces. The number of *Oesophagostomum* eggs per gramme of faeces did not show any significant change as a result of the treatment. N.J.

(247dh) Mayhew *et al.* summarize the results of 16 experiments on the low level feeding of phenothiazine to cattle infected with *Cooperia punctata*, which have shown that 0.5 gm. is as effective as 1.5 to 12 gm. in greatly reducing or suppressing altogether the development of infective larvae. S.W.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24-27, 1958.

247—Journal of Parasitology (cont.)

- †di. DRUDGE, J. H., LELAND, Jr., S. E., WYANT, Z. N. & ELAM, G. W., 1958.—“Observations on the resistance of a strain of *Haemonchus contortus* to single therapeutic doses of phenothiazine.” **44** (4, Sect. 2), 40.
- †dj. THORSON, R. & PANKAVICH, J., 1958.—“An analysis of the fluctuation of hookworm egg counts of puppies in a screening program.” **44** (4, Sect. 2), 40.
- †dk. MAYHEW, R. L., TORBERT, B. G. & MILLER, G. C., 1958.—“Immunity to *Cooperia punctata* in pure infections in cattle.” **44** (4, Sect. 2), 40–41.
- †dl. VILLELLA, J. B., 1958.—“Observations on the time and number of molts in the intestinal phase of *Trichinella spiralis*.” **44** (4, Sect. 2), 41.
- †dm. HUGHINS, E. J., 1958.—“Guinea worms in a raccoon from South Dakota and in mink from Minnesota.” **44** (4, Sect. 2), 41–42.
- †dn. MEYER, M. C., 1958.—“Studies on *Philonema agubernaculum*, a dracunculoid nematode infecting salmonids.” **44** (4, Sect. 2), 42.

(247di) Lambs reared worm-free were experimentally infected with 2,500 larvae of *Haemonchus contortus*; half the animals were infected with strain A and half with strain B, the latter known to possess some degree of phenothiazine resistance. Commercial grade phenothiazine was given 40 days after infection in single doses of 0.10, 0.25 and 0.50 gm. per pound body-weight. Worm counts were made on the treated lambs and on a similar number of untreated lambs at autopsy one week later. The worm removal efficiency for strain A, male and female *H. contortus* was 89% and 98% in seven lambs given 0.10 gm. per lb., 100% and 100% in six lambs given 0.25 gm. per lb., and 100% and 100% in one lamb given 0.5 gm. per lb. For strain B, the removal efficiency for respective dosages was 55% and 69% in seven lambs, 81% and 97% in six lambs and 44% and 76% in one lamb. O.D.S.

(247dj) Thorson & Pankavich carried out hookworm egg counts in 27 untreated dogs, starting from 27 to 33 days after infection and continuing for three to 39 weeks. In 140 observations only one egg count decreased by more than 75%. Therefore a drop of more than 60% after treatment could be considered a direct result of therapy. It is also suggested that one animal is enough to provide initial test evidence of the efficacy of a compound. N.J.

(247dk) Mayhew *et al.* report that all of 25 animals inoculated with pure cultures of *Cooperia punctata* developed immunity against this parasite. The immunity was shown by cyclic egg production by the nematode. It was lower or higher as a result of inoculation slightly increasing or decreasing, the cycle being repeated up to three times. After the third drop it remained low. Reinoculation caused slight increase in the egg count in some cases. In other cases the animals were rendered completely negative. Seven animals thus immunized were inoculated with *Oesophagostomum radiatum* and larvae and eggs of this parasite were recovered, indicating that the immunity to *C. punctata* did not extend to *O. radiatum*. N.J.

(247dl) In order to determine the time of moulting of *Trichinella spiralis*, Villella intubated excysted larvae into white rats. In the case of female worms the first moult occurred at 6 hours, the second at 12 hours, the third at 18 hours and the fourth at 24 hours. Male *T. spiralis* underwent the corresponding moults at 12, 18, 24 and 30 hours respectively after infection of the host. N.J.

(247dm) [The full account of this paper appears in *Proc. S. Dak. Acad. Sci.*, **37**, 40–46. For abstract see No. 275a below.]

(247dn) Meyer reports on the high incidence of *Philonema agubernaculum* (Nematoda) in *Salmo salar* and *Salvelinus fontinalis*. The morphology of the parasite is briefly described and the larvae are reported to remain viable in lake water for 14 days, during which *Cyclops* sp. were infected. On feeding *Cyclops* to salmon inconclusive results were obtained. Various species of fish were examined as possible second intermediate hosts, *Notemigonus crysoleucas*, *Osmerus mordax* and *Hybopsis plumbea*, all with negative results. W.G.I.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.

247—Journal of Parasitology (cont.)

- †do. KRUIDENIER, F. J. & VATTER, A. E., 1958.—“Ultrastructure at the surface of cercariae of *S. mansoni* and of a plagiorchoid (*Tetrapapillatrema concavocorpa*?).” **44** (4, Sect. 2), 42.
- †dp. PETERS, L. E., 1958.—“Systematic position of the genus *Dihemistephanus* (Trematoda: Digenea).” **44** (4, Sect. 2), 42–43.
- †dq. HALL, J. E., 1958.—“Studies on the life history of *Mosesia chordeilesia* McMullen 1936 (Trematoda: Lecithodendriidae).” **44** (4, Sect. 2), 43.
- †dr. ROBINSON, Jr., E. J., 1958.—“Some trematodes of the genus *Hasstilesia* from unusual hosts.” **44** (4, Sect. 2), 43.
- †ds. HARKEMA, R. & MILLER, G. C., 1958.—“A new strigeid trematode (Diplostomatidae: Alariinae) from the pancreatic duct of the raccoon.” **44** (4, Sect. 2), 43.
- †dt. ETGES, F. J. & SIRKIN, M. J., 1958.—“Effects of colchicine on *Hymenolepis nana*.” **44** (4, Sect. 2), 43–44.
- †du. OGREN, R. E., 1958.—“Structures in the oncosphere of *Hymenolepis diminuta*, a cestode in rats.” **44** (4, Sect. 2), 44.

(247do) Kruidenier & Vatter have demonstrated that stratification is present at the surface of cercariae of *Schistosoma mansoni* and *Tetrapapillatrema concavocorpa*; a basal portion appears to be identical in each but the intermediate and surface areas differ in micromorphology. The differences are briefly described and discussed. S.W.

(247dp) Peters discusses the morphology of *Dihemistephanus* and concludes that it has a close affinity with the Lepocreadiidae and should not be included in the Acanthocolpidae. S.W.

(247dq) Hall has shown *Cercaria neustica* to be the larva of *Mosesia chordeilesia*. It penetrated and encysted in naiads of *Hexagenia limbata*. When naiads containing metacercariae at least 44 days old were fed to newly hatched chicks and one young hamster, ovigerous adults were recovered three to 28 days later. *Contopus virens* was found to be a natural definitive host. Attempts to infect *Goniobasis livescens* (a known snail host) were unsuccessful. S.W.

(247ds) [The full account of this paper appears in *J. Parasit.*, **45**, 151–153.]

(247dt) Colchicine, known as a mitotic inhibitor, was given to white mice infected with *Hymenolepis nana* at a total dosage of 0.1 to 0.5 mg. The drug was given as a 1/1000 solution and the length of treatment varied according to the survival time of the mice. Worms were recovered at autopsy from treated mice and untreated controls. Worms from the controls were normal but those from the treated animals showed morphological variations such as incomplete separation of the proglottides, failure to produce genital pores in all segments, partial duplication of the receptaculum seminis, reduction or absence of testicular tissue, failure to produce eggs in most proglottides and abnormality in those eggs produced. It was concluded that colchicine inhibits normal morphological differentiation of proglottides in *H. nana* and interferes with the development of normal structural relationships of adjacent proglottides. O.D.S.

(247du) Ogren reports on the anatomy of *Hymenolepis diminuta*. The oncosphere is a typical hexacanth embryo and develops from a spherical morula. A cuticle encloses the body which is composed of contractile parenchyma. Three pairs of hooks, medullary centre and granule-filled epidermal glands are present. An intermediate colloidal cushion (pseudo-embryophore) and an outer shell capsule enclose the embryo. N.J.

†Abstract of paper presented at the 33rd Annual Meeting, American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.

247—Journal of Parasitology (cont.)

- dv. KAGAN, I. G. & OLIVER-GONZÁLEZ, J., 1958.—“Hemagglutination studies with schistosome antigens.” **44** (5), 457–460.
- dw. WYKOFF, D. E., 1958.—“Studies on *Clonorchis sinensis*. III. The host-parasite relations in the rabbit and observations on the relative susceptibility of certain laboratory hosts.” **44** (5), 461–466.
- dx. DAVIS, A. D., 1958.—“Occurrence of larval trematodes in the Columbia Basin.” **44** (5), 467–470.
- dy. JORDAN, H. E. & BYRD, E. E., 1958.—“*Paragonimus* in wild and domesticated animals in Georgia.” **44** (5), 470.

(247dv) Kagan & Oliver-González used the haemagglutination test to check the reaction of antisera prepared in rabbits against whole eggs and extracts of cercariae and adults of *Schistosoma mansoni* with homologous and heterologous antigens. Egg antigens of *S. haematobium*, *S. mansoni* and *Schistosomatium douthitti* and cercarial and adult antigens of *Schistosoma mansoni* gave cross reactions with these sera. Egg antigen of *S. mansoni* gave higher titres than cercarial or adult antigens with sera of five children suffering from schistosomiasis mansoni. With sera from ten adult patients cercarial antigen gave the best results. Four adult sera collected during active chronic infection were positive by haemagglutination before treatment and cure, but negative thereafter. The authors conclude that haemagglutination provides a sensitive test for the diagnosis of schistosome infections, and that with the development of improved antigens it may provide a valuable serological method for the evaluation of chemotherapeutic cure.

J.M.W.

(247dw) Wykoff used metacercariae of *Clonorchis sinensis*, shipped to the laboratory from Japan under refrigeration, to infect laboratory animals. The metacercariae retained viability for at least 60 days after the death of the host. 10 rabbits, 12 guinea-pigs and 11 white rats received orally 10 to 1,000 of the larvae. 6% of the metacercariae reached the sexually mature stage in rats, and about one-third of them reached that stage in rabbits and guinea-pigs. The percentage of adult worms found in the definitive hosts did not show any marked dependence on the degree of infection. Eggs were found at an average of 22 days after infection in rabbits and after 20 days in guinea-pigs. An experiment with another group of 17 rabbits which were given orally one to nine *C. sinensis* metacercariae showed that five metacercariae were enough to produce demonstrable infections. A dose of 1,000 metacercariae was lethal to guinea-pigs, whereas rabbits survived an even larger dose. The average size of the adult worms did not seem to depend on their number in the host. Attempts to infect *Fluminicola coloradoense*, *F. fusca*, *Gillia altilis* and *Bulinus tentaculatus* with *C. sinensis* were unsuccessful.

N.J.

(247dx) Davis has studied the larval trematodes in 3,566 aquatic snails (*Physa propinqua* and *Stagnicola palustris nuttalliana*) in various habitats in the Columbia basin. 987 were found to be infected with the following major groups of cercariae: monostome, echinostome, xiphidiocercariae (both with and without a fin-fold), leptocercous, apharyngeal brevifurcate distome furcocercous, and pharyngeal longifurcate distome furcocercous. Sporocysts and rediae were also found. An encysted metacercaria was the commonest occurring in 761 of the *Stagnicola* and 82 of the *Physa* examined. Seep ponds and seep lakes had the highest incidence of infection and irrigation canals the lowest.

S.W.

(247dy) Jordan & Byrd report on the finding of *Paragonimus kellicotti* in *Lynx rufus* in Georgia. The authors refer to Cooperrider's report on finding *Paragonimus* in swine in 1949–50 and to McIntosh's report on finding this parasite in pigs in 1954. Reference is also made to the finding of *Paragonimus* by Blount in a pointer dog.

N.J.

247—Journal of Parasitology (cont.)

- dz. BASSETT, L. W., 1958.—“Tissue response to infection with *Conspicuum icteridorum* (Trematoda), in the gall bladder of the Brewer blackbird.” **44** (5), 471-476.
- ea. OGREN, R. E., 1958.—“The hexacanth embryo of a dilepidid tapeworm. I. The development of hooks and contractile parenchyma.” **44** (5), 477-483.
- eb. SCHAD, G. A. & RAUGHT, R. W., 1958.—“*Thelazia californiensis* from a mule deer, *Odocoileus hemionus crooki* (Mearns, 1879), in New Mexico.” **44** (5), 483.
- ec. ABDOU, A. H., 1958.—“Studies on the development of *Davainea proglottina* in the intermediate host.” **44** (5), 484-488.
- ed. DOUGLAS, L. T., 1958.—“Seasonal variations in *Baerietta diana*.” **44** (5), 489-491.
- ee. BURNETT, H. S. & WAGNER, E. D., 1958.—“Two new definitive hosts for the eye worm, *Thelazia californiensis* Price 1930.” **44** (5), 502.

(247dz) Bassett has examined the gall-bladders of 70 *Euphagus cyanocephalus* in southern California and found more than half of them to be infected with *Conspicuum icteridorum*. Marked histological changes associated with the infection occurred in the gall-bladders. These are divided into two broad headings: the acute stage with an inflammatory reaction followed by a healing period during which connective tissue is elaborated and the second stage, which is further subdivided into chronic and malignant. The chronic stage may be permanent and results from the continued ability of the host tissue to heal in the presence of the flukes; it is characterized by the formation of mushroom-like tufts which lack definite columnar epithelium and within which there is considerable proliferation of connective tissue which displaces pre-existing muscle bundles. The malignant stage which was only infrequently found results in adenomatous tissue growth, seemingly caused by the inability of the tissue to maintain metabolic equilibrium under continued irritation. S.W.

(247ea) Ogren reports on the development of the hooks and contractile parenchyma of the hexacanth embryo of a dilepidid tapeworm, *Dilepis undula*, from the small intestine of the robin, *Turdus migratorius*. The development of this embryo is characteristic of some genera of the Dilepididae. The hooks developed in the cortical cells of the morula. Contractile parenchyma originated from the embryonic mesenchyme. Medullary as well as cortical fibre systems were present to account for body and hook movements, and it is suggested that these are homologous with the circular and longitudinal muscle systems of the metacestode. By developing cuticle, hooks, muscular parenchyma and epidermal glands, the morula became an oncosphere. N.J.

(247eb) Schad & Raught report the collection of four female *Thelazia californiensis* from a mule deer, *Odocoileus hemionus crooki*, in New Mexico. J.M.W.

(247ec) Abdou reports that the following 11 species of slugs are capable of acting as intermediate hosts of *Davainea proglottina*: *Agriolimax agrestis*, *Limax cinereus*, *L. flavus*, *Arion empericorum*, *A. hortensis*, *A. circumscriptus*, *A. intermedius*, *Agriolimax reticulatus*, *A. caruanae*, *Milax gracilis*, and *M. sowerbyi*. Gravid segments, collected from fowl faeces were fed to slugs under laboratory conditions. The hexacanth embryo hatched in the gut of the slug, penetrated the gut wall and fixed itself in the body-cavity. The oncosphere differentiated one pole to form a scolex, which is withdrawn into the cavity before maturation. In order to study the inner structure of the scolex, excystment was induced. A rudimentary caudal appendage was observed on the cysticercoids. The rate of development depends on the environmental temperature of the slug. N.J.

(247ed) Douglas has studied seasonal variations in *Baerietta diana*, collected from salamanders of the species *Batrachoseps attenuatus*, on the coast of California. The report shows that after about eight months of growth the worms die. N.J.

(247ee) Burnett & Wagner, working in California, found seven out of 154 jack-rabbits, eight out of 52 coyotes and one silver fox from a farm to be infected with *Thelazia californiensis*. 53 bobcats, 12 wild foxes, ten cotton-tail rabbits, six ground squirrels, five raccoons, three skunks, two badgers and one opossum examined were not infected. This constitutes the first report of this worm in jack-rabbits and foxes. J.M.W.

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- ef. ALLEN, R. W. & BECKLUND, W. W., 1958.—“*Cooperia mcmasteri* and *Cooperia surnabada* in the United States.” **44** (5), 503–506.
- eg. SCOTT, J. A., MACDONALD, E. M. & OLSON, L. J., 1958.—“The early induction in cotton rats of immunity to their filarial worms.” **44** (5), 507–511.
- eh. KERR, K. B., 1958.—“Notes on *Ascaridia dissimilis*.” **44** (5), 512–514.
- ei. CHIN THACK SOH, 1958.—“The distribution and persistence of hookworm larvae in the tissues of mice in relation to species and to routes of inoculation.” **44** (5), 515–519.
- ej. BABERO, B. B. & SHEPPERSON, J. R., 1958.—“Some helminths of raccoons in Georgia.” **44** (5), 519.

(247ef) Allen & Becklund record the recovery of three male specimens of *Cooperia mcmasteri* Gordon, 1932 from a bovine host in Arizona. This species was originally recorded from a calf in Australia and has since been reported from England and Poland. The bursa and spicules of their specimens are figured and the relative status of *C. mcmasteri* and *C. surnabada* Antipin, 1931 is discussed. The authors conclude that there is considerable evidence to suggest that the two names are synonymous but prefer to consider the species distinct until the types have been compared. *C. mcmasteri* is also recorded from cattle in Oregon and from deer (*Odocoileus hemionus columbianus*) in California; all localities being in the U.S.A.

W.G.I.

(247eg) Scott *et al.* found that the growth of *Litomosoides carinii* in cotton-rats which had been previously infected with this species was retarded during the first 24 days of their development. The growth of seven-day-old worms when transferred surgically to previously infected cotton-rats was not retarded during the subsequent 17 days. In the reverse experiment in which seven-day-old worms from previously infected cotton-rats were transferred to uninfected cotton-rats the growth of the worms was retarded during the 17-day period after transfer.

W.P.R.

(247eh) Kerr reports on *Ascaridia dissimilis*, which differs from *A. galli* in that the spicules are half as long and have the funnel portion more acutely angled. It has been shown that turkeys get infected with *A. dissimilis* more readily than chickens. On the other hand chickens get more readily infected with *A. galli*. Turkeys however show greater affinity for *A. galli* than chickens for *A. dissimilis*. Piperazine is indicated as an effective cure against *A. dissimilis*. In appropriate dosage it is stated to remove 90% of mature worms.

N.J.

(247ei) Chin Thack Soh reports on the distribution and persistence of hookworm larvae in the tissues of mice in relation to the routes of inoculation. Three species of hookworm were used: *Ancylostoma caninum*, *A. duodenale* and *Necator americanus*. Larvae were inoculated to each group of seven mice via skin, buccal mucosa and stomach. Mice were sacrificed at intervals during 66 days and larvae were recovered from the lungs and liver, and from both the tissues and contents of the small intestine. A combination of peptic digestion and Baermann isolation was used for isolating larvae from shredded tissues. The route of inoculation had no effect on the total number of worms recovered, but had an important influence on the distribution of the larvae among the different organs. The larvae of *A. caninum* promptly migrated into the muscles where 10% persisted for 66 days without growth. Those of *A. duodenale* behaved in a similar way, but were also found in the viscera up to 36 days and only 1% to 2% were recovered 66 days after inoculation. The larvae of *N. americanus* underwent rapid growth and disappeared from the tissues after six days in all except two mice, in the liver of one of which seven larvae were found after 24 days and in the muscle of the other of which five larvae were found on the 30th day. The larvae of *N. americanus* occurred principally in the lungs and the muscles; some were found in the liver but none were localized in the tissues or contents of the small intestine.

N.J.

(247ej) In this research note, Babero & Shepperson list the helminths recovered from six raccoons in Central Georgia; they are *Apophallus venustus*, *Euryhalmis squamula*, *Eurytrema procyonis*, *Fibricola* sp., *F. texensis*, *Pharyngostomoides procyonis*, *Arthrocephalus lotoris*, *Ascaris*

247—Journal of Parasitology (cont.)

- ek. ZIMMERMANN, W. J. & SCHWARTE, L. H., 1958.—“Trichiniasis in dogs and cats of Iowa.” **44** (5), 520–522.
- el. SCHWABE, C. W. & SCHINAZI, L. A., 1958.—“Distribution of protonephridial flame cells in larval *Echinococcus granulosus*.” **44** (5), 558.
- em. CHATTERJI, P. N., 1958.—“On a new avian trematode of the genus *Cyclocoelum* Brandes, 1892.” **44** (5), 559–565.
- en. SOGANDARES-BERNAL, F. & HUTTON, R. F., 1958.—“The status of the trematode genus *Bianium* Stunkard, 1930, a synonym of *Diploproctodaeum* La Rue, 1926.” **44** (5), 566–567.
- eo. HASKINS, W. T. & OLIVIER, L., 1958.—“Nitrogenous excretory products of *Taenia taeniaeformis* larvae.” **44** (6), 569–573.

columnaris, *Crenosoma* (?) *goblei*, *Gnathostoma spinigerum* (recorded for the first time for this host), *G. procyonis*, *Molineus barbatus*, *Physaloptera rara*, *Mesocestoides lineatus*, *Oochoristica procyonis* and *Macracanthorhynchus ingens*. Data on their pathogenicity and a study of the morphological variation of adult members of *Euryhelms* will be reported elsewhere. G.I.P.

(247ek) Zimmermann & Schwarte examined 521 dogs and 50 cats in Iowa for *Trichinella spiralis* infection, using an artificial digestion method. 10% of the dogs and 6% of the cats were found to be infected. Infections were generally light. Prevalence increased with age but was not affected by sex or breed. J.M.W.

(247el) Schwabe & Schinazi report on the distribution of protonephridial flame cells in larval *Echinococcus granulosus*. Flame cells were most apparent in vesicular scoleces, but they were also found (i) near the periphery of invaginated scoleces, (ii) in the stalk attaching the scolex to the brood capsule and (iii) in the brood capsule membrane. No flame cells were seen in the germinal membrane of mother cysts. N.J.

(247em) Chatterji describes *Cyclocoelum titiri* n.sp. from 30 specimens of this trematode found in the body-cavity of one out of ten *Haplopterus ventralis* caught near Allahabad U.P., India. In *C. titiri* the ovary lies anterior to both testes, the three gonads forming the three points of a triangle. The new species resembles *C. nebularium* and *C. dollfusi*, differing from the former in body shape and size, more posterior extent of the uterus and in having the vitellaria joined at the hind end of the body, and from the latter in having smaller and more spherical testes and a larger oral sucker. Differentiation from other species of *Cyclocoelum* is given. The description of *C. titiri* is accompanied by one text figure. Chatterji discusses the taxonomy of the Cyclocoelidae Kossack, 1911 and considers the Cyclocoelinae Stossich, 1902 to be the only valid subfamily with *Cyclocoelum* Brandes, 1892 and *Typhlocoelum* Stossich, 1902 the only valid genera. He separates the species of each of these genera into three groups based upon the position of the ovary relative to the testes, each group being divided into two subgroups on the triangular or linear arrangement of the testes and ovary. I.C.W.

(247en) From an examination of type and other specimens Sogandares-Bernal & Hutton show that *Bianium* Stunkard, 1930 is a synonym of *Diploproctodaeum* La Rue, 1926. *Diploporus* Ozaki, 1928 is preoccupied by *Diploporus* Von Buch, 1845 and by *Diploporus* (Troschel, MS) Martens, 1866 and its species are congeneric with *Diploproctodaeum haustum* (MacCallum, 1918) La Rue, 1926 and *Psilostomum plicium* Linton, 1928. The species now in *Diploproctodaeum* are listed with their synonyms and the following new combinations are made: *D. plicium* (Linton, 1928), *D. cryptostoma* (Ozaki, 1928), *D. hemistoma* (Ozaki, 1928), *D. holocentri* (Yamaguti, 1942), and *D. tetradontis* (Nagaty, 1956). Although Yamaguti considers *Diplocreadium* as a synonym of *Bianium* the authors prefer to retain this genus pending further investigation. S.W.

(247eo) Haskins & Olivier found that larvae of *Taenia taeniaeformis* cultured under axenic conditions produced 400–600 µgm. nitrogen per gm. wet weight per 24 hours. Of this nitrogen 17.5% was due to ammonia; 15%, volatile amines; 33%, urea; 11.7%, amino-acids and 27%, peptides. The amines included ethylene diamine, cadaverine, 1-amino-2-propanol, methyl amine, ethyl amine, and butyl amine. The free amino-acids included glycine, alanine, valine, methionine, leucine, proline and tyrosine. W.P.R.

247—Journal of Parasitology (cont.)

- ep. HUTCHISON, W. M., 1958.—“Studies on *Hydatigera taeniaeformis*. I. Growth of the larval stage.” **44** (6), 574–582.
- eq. ROTHSTEIN, N., 1958.—“Vital staining of blood parasites with acridine orange.” **44** (6), 588–594.
- er. HERLICH, H., 1958.—“Further observations on the experimental host-parasite relations of the guinea pig and the ruminant parasite, *Trichostrongylus colubriformis*.” **44** (6), 602.
- es. BURROWS, R. B., 1958.—“The anthelmintic effect of bephenium on *Ancylostoma caninum*.” **44** (6), 607–610.
- et. YOUNG, M. D., JEFFERY, G. M., FREED, J. E. & MOREHOUSE, W. G., 1958.—“Bephenium, a new drug active against human hookworm.” **44** (6), 611–612.

(247ep) Hutchison reports on the growth of *Hydatigera taeniaeformis*. The development of the parasite was followed in mice, which had been experimentally infected with eggs from adult worms in cats. On the 30th day after infection an invaginated cysticercus developed which evaginated on the 42nd day. A strobilocercus was formed by about the 48th day. After 60 days infective strobilocerci were obtained. Rapid growth was noted during the first six weeks, after which it slowed down but continued until the 22nd week, being more markedly retarded in the case of heavy worm burdens. N.J.

(247eq) Rothstein reports on vital staining of blood parasites with acridine orange. Observation of microfilariae under dark field illumination is described using concentrations ranging from 1:3,000 to 1:12,500,000. The use of suitable glass filters eliminated the disadvantage of thick blood suspensions and allowed more rapid observation of leucocytes and blood parasites. N.J.

(247er) As a result of infecting guinea-pigs *per os* with infective larvae of *Trichostrongylus colubriformis* cultured from eggs in faeces collected from an experimentally infected calf, Herlich concluded that (i) the susceptibility of guinea-pigs to infection with this nematode is highly variable; (ii) the sex and age of the host have little or no effect on susceptibility to infection; and (iii) *T. colubriformis* is detrimental to the health of guinea-pigs, with lethal infections resulting from the administration of 4,150 to 10,000 infective larvae. J.M.W.

(247es) Critical tests were carried out in 15 dogs and 35 cats infected with *Ancylostoma caninum* to determine the effectiveness of various salts of bephenium, a new anthelmintic. Incidental observation was made concerning the effectiveness of the drug against *Toxocara cati*, *T. canis*, *Trichuris vulpis*, *Physaloptera* sp., *Dipylidium caninum*, *Taenia pisiformis* and *Hydatigera taeniaeformis*. All infections were naturally acquired. The drug was given in a single oral dose at several dose levels for each salt, all dosage computed in terms of base. All faeces were collected for 48 hours after treatment and hookworm counts made. At the end of this time the animals were killed and the entire intestine was examined for residual worms. Hookworms were found in the faeces as early as three hours after dosing and of the worms passed 97% appeared in the first 24 hours. The dose ranged from 2.5 mg. per kg. body-weight to 100 mg. per kg. The majority of hookworms were killed and eliminated at all dose levels, the critical dose being 20 mg. per kg. and above. At this level 99.4% of the hookworms were eliminated and 17 of 19 animals cleared. Of the 50 animals treated at all dose levels 39 were cleared and 97.1% of the total worms eliminated. With *Toxocara* spp. 66.6% of the worms were eliminated from seven animals dosed at 50 mg. per kg. or above and 24.3% were eliminated from 17 animals dosed at less than 50 mg. per kg. No significant effect was observed against *Trichuris vulpis* or any tapeworms. In one dog harbouring six *Physaloptera*, three worms were passed after a single dose of 50 mg. per kg. bephenium chloride. In *in vitro* tests, *A. caninum* and *Toxocara cati* proved more susceptible than *Trichuris vulpis*. Of the 50 animals treated nine showed nausea and vomiting. Of these, seven received doses of 50 mg. per kg. or above. Vomiting was rare in animals receiving 20–25 mg. per kg. or less. O.D.S.

(247et) Bephenium chloride was given in capsules before breakfast to 20 female inmates of a mental hospital shown to have light to moderate infections of *Necator americanus*. Each capsule contained 400 mg. of salt and the dose given was 1.2 gm. (1.056 gm. base) on one day or for five successive days. Follow-up was carried on at intervals during 15 weeks. As

247—Journal of Parasitology (cont.)

- eu. PISTEY, W. R., 1958.—“Studies on the development of *Dirofilaria tenuis* Chandler 1942.” **44** (6), 613–622, 623–626.
- ev. BARBOSA, F. S., BARBOSA, I. & RODRIGUEZ, J. D., 1958.—“*Tropicorbis philippianus* (Dunker) a potential intermediate host of *Schistosoma mansoni* in Ecuador.” **44** (6), 622.
- ew. HUTTON, R. F. & SOGANDARES-BERNAL, F., 1958.—“Variation in the number of oral spines of *Phagicola longicollis* Kuntz and Chandler, 1956, and the description of *P. inglei* n.sp. (Trematoda: Heterophyidae).” **44** (6), 627–632.

estimated by egg counts, the single dose removed about half the hookworms while the five-day course removed about 79% of the worms. Of 14 patients harbouring *Trichuris trichiura* and who received the single dose, examination 15 weeks later showed that one infection had been eliminated and that the over-all reduction in egg count was 14%. No toxic side effects or nausea or vomiting were observed. These observations were of a preliminary nature and further work with other salts of bephenium is planned. O.D.S.

(247eu) *Dirofilaria tenuis* of the raccoon, *Procyon lotor elucus*, developed rapidly to the infective third-stage larva in *Anopheles quadrimaculatus* and *Aedes taeniorhynchus*. Third-stage larvae were found in one *A. sollicitans* out of seven which fed on an infected raccoon, and in one out of 30 *Psorophora ferox*; while second-stage larvae were found in one out of forty-six *P. ferox* and two out of ten *A. infirmatus*. No development was observed in *Culex* spp., *C. nigripalpis*, *A. aegypti*, *A. atlanticus-tormentor*, *A. fulvus pallens*, *Wyeomyia vanduzeei* or *W. mitchellii*. The development of the larvae in *A. taeniorhynchus* (which Pistey believes to be the natural vector) is described in detail. The pre-larvae migrate directly from the gut to the Malpighian tubules where development is somewhat asynchronous, occasional pre-larvae becoming encapsulated in the tubules. The first moult occurred after seven to eight days, and the second after nine to ten days during June to September of 1954–56. The larvae pass into the haemocoel either directly from the tubules or after migrating to the ventriculus, and were found in the proboscis after 10–12 days. No papillae were found on the tail of the infective larvae. Infected *A. taeniorhynchus* were allowed to feed on two three-week-old raccoons which had been bred in the laboratory and on two 3 to 4-month-old animals which had been caught wild. Two female and two male worms were found in one of the laboratory-reared raccoons after 14 months, and one female worm in one of the two other animals after 7 to 8½ months; no microfilariæ were found in any of the four raccoons. Four mongrel puppies were inoculated subcutaneously with 6, 9, 25 and 44 infective larvae, but no worms were found three-and-a-half months later. W.A.F.W.

(247ev) Barbosa, Barbosa & Rodriguez have exposed 17 laboratory-bred specimens of *Tropicorbis philippianus* originating from Guayaquil, Ecuador to miracidia (20 per snail) of *Schistosoma mansoni* from Belo Horizonte, Brazil. 14 snails survived to 30 days after exposure and one of them shed cercariae at 28 days. The incubation temperature of the snails was between 24° and 26°C. This is the second case of a snail from the west coast of South America, where schistosomiasis is not endemic, being proved a potential intermediate host for Brazilian *S. mansoni*. C.W.

(247ew) The authors, on re-examination of Kuntz & Chandler's original material of *Phagicola longicollis* have counted 16 and even 17 oral spines in some of the specimens and propose to emend its description to include a variation of from 14 to 17 spines. Some of Chandler's material obtained from a dog in Cairo contained one specimen which was very similar to *P. longa* and which the authors describe as *P. inglei* n.sp. In the new species the pharynx is located less than one-third of the body length from the anterior end and the oral appendage almost comes into contact with the pharynx, while the pharynx of *P. longa* approaches the mid-body and the appendage reaches almost half-way to it; the vitellaria extend to the anterior border of the ovary, while in *P. longa* they are restricted behind the ovary; the crown bears 19 heavy spines which are hooked at the tips, while in *P. longa* there are 15 to 18 lighter straight spines; the oesophagus is three times longer and the eggs twice the size of those in *P. longa*. The authors give a key to *Phagicola*, *Ascocotyle* and *Parascotyle*, for the present accepting these as individual genera in their strict sense, and list the species included in each. G.I.P.

247—Journal of Parasitology (cont.)

- ex. GRODHAUS, G. & KEH, B., 1958.—“The marine, dermatitis-producing cercaria of *Austro-bilharzia variglandis* in California (Trematoda: Schistosomatidae).” **44** (6), 633–638.
- ey. PREMVATI, 1958.—“*Primatotrema macacae* gen.nov., sp.nov. from Macaque rhesus monkeys, and a redescription of *Phaneropsolus oviforme* Poirier (1886) Looss, 1899 (Lecithodendriidae).” **44** (6), 639–642.
- ez. SROUFE, Jr., S. A., 1958.—“*Mazocraeoides olentangiensis* n.sp., a monogenetic trematode parasitic on the gills of the gizzard shad, *Dorosoma cepedianum* (Le Sueur).” **44** (6), 643–646.
- fa. THATCHER, V. E. & SPARKS, A. K., 1958.—“A new species of *Dicrogaster* (Trematoda, Haploporidae) from *Mugil cephalus* in the Gulf of Mexico.” **44** (6), 647–648.
- fb. FISHER, F. M. & WEST, A. F., 1958.—“*Cercaria megalura* Cort, 1914, the larva of a species of *Philophthalmus*.” **44** (6), 648.
- fc. SENFT, A. W., 1958.—“A perfusion apparatus for maintenance and observation of schistosomes *in vitro*.” **44** (6), 652–658.

(247ex) Grodhaus & Keh report the presence of the cercaria of *Austro-bilharzia variglandis* in the marine snail *Nassarius obsoletus* in San Francisco Bay, where it appears to be the cause of extensive outbreaks of dermatitis. Studies of body dimensions indicate that the deviations from previous descriptions of *A. variglandis* do not exceed the variations in the form being described. An account is given of the behaviour of the cercaria. Infected snails were found during every month of the year except May and September; but specimens smaller than 20 mm. were always free of infection. P.K.

(247ey) Out of 1,000 intestines of Macaque Rhesus monkeys examined for all helminths only four were infected with *Primatotrema macacae* n.g., n.sp., the intensity varying from 6 to 18 flukes per monkey. The new genus is placed in the *Phaneropsolia* in *Lecithodendriinae* and is most similar to *Phaneropsolus* but has a genital pore well anterior to the pharynx, the ovary on the right of the ventral sucker and lacks an oesophagus. Other differential characters are the elongate cirrus pouch and vitellaria which are in clusters of six to eight follicles on either side of the anterior part of the body. *Phaneropsolus oviforme*, which were found on two occasions in Rhesus monkeys and which differ in measurements of the body and the organs from the original specimens, are redescribed. G.I.P.

(247ez) Sroufe describes briefly a new species of monogenetic trematode, *Mazocraeoides olentangiensis*, parasitic on the gills of the fresh-water fish *Dorosoma cepedianum* from the Olentangy River, Ohio. Of the previously described species in this genus, *M. olentangiensis* most closely resembles *M. georgei* but differs in the measurements of the hard parts, the extent of the ovary, the morphology of the genital corona, the number of polar filaments of the egg, and the difference in hosts. This brings to five the number of described species in this genus. I.L.O.

(247fa) *Dicrogaster fastigatus* n.sp. from *Mugil cephalus* differs from *D. perpusillus* and *D. contractus* in that it is considerably larger, measuring 0.274–0.86 mm. in length, the oral and ventral suckers are much smaller and the vitelline gland is a single lobe; it is bilobed in the other two species. A member of the Haploporidae is recorded for the first time in North America. H.H.W.

(247fb) Fisher & West state that *Cercaria megalura*, although it has been found in the cloaca, normally develops in the orbit of birds. It encysts on various surfaces but shows a marked preference for chitin, which indicates that natural infections might occur through eating arthropods. Metacercariae migrate up the oesophagus and naso-lachrymal canal to the orbit after ingestion. The cercaria is found to develop into a worm of the genus *Philophthalmus*. P.K.

(247fc) Senft describes an apparatus for *in vitro* maintenance and observation of schistosomes. The apparatus comprises a reservoir bottle with an inlet for gas mixtures and substances added to the medium, a simple pump to provide a pulsating flow of medium, a hydrostatic reservoir to allow adjustment of pressure and flow, an enclosed observation chamber with temperature controlled inflow, and an outflow leading back to the reservoir bottle through a filter. Details are given of aseptic assembly, sterilization by a gas-penetration technique and operation of the apparatus. J.E.D.K.

247—Journal of Parasitology (cont.)

- fd. BRENER, Z. & PELLEGRINO, J., 1958.—“Chemotherapy of experimental schistosomiasis. I. Drug activity and mode of action of a new thioxanthone derivative.” **44** (6), 659–664.

(247fd) A new thioxanthone derivative, 1-(diethylaminoethylamino)-4,6,8-trimethyl-5-azo-thioxanthone hydrochloride (Ciba 17'581) was tested against experimental infections of *Schistosoma mansoni* in mice. The drug was given orally at 300 mg. per kg. body-weight daily for five days in two series of animals at 32 and 42 days after infection respectively. The animals were killed 52 days after infection. Assessment of activity was based on the determination of the number of granulomata isolated from the livers of treated and control animals and the number of living worms recovered from the liver and mesenteric veins. No living worms were found in any of the treated animals and relatively few granulomata were observed in the livers of these animals compared with the controls. Hepatic shift commenced within 24 hours of commencement of treatment, ensheathment in the liver was observed on the third day and was well advanced by the seventh day. Hepatic shift was complete by the twelfth day and most worms were surrounded and invaded by inflammatory cells at this time. From their observations the authors suggest that currently available schistosomicides act by some functional disturbance of the schistosomes followed by non-specific phagocytic destruction in the liver. O.D.S.

248—Journal of Tropical Medicine and Hygiene.

- a. MORGAN, H. V., 1958.—“Onchocerciasis in the Northern Sudan.” **61** (6), 145–147.
b. EL-NAGAR, H., 1958.—“Control of schistosomiasis in the Gezira, Sudan.” **61** (9), 231–235.

(248a) Morgan reports finding onchocerciasis in 30 out of 73 schoolboys examined in the town of Abu Hamed, Northern Province of the Sudan. Most of the infected boys came from the stretch of Nile between the fourth and fifth cataracts. 35 clinically positive cases were found among 70 residents of the Abu Hamed district. 28 of these cases showed ocular involvement. This focus of onchocerciasis is located nearly 1,000 miles from the nearest recognized endemic area of the disease, and in unusual territory inasmuch as the Nile at this point flows through hot, dry, barren desert with only a narrow fringe of cultivation along its banks. The vector—*Simulium dammosum*—is abundant only from October to March, showing peak incidence in December and January. J.M.W.

(248b) The Medical Officer of Health of the Gezira irrigated area in the Sudan states that the snail vectors of intestinal schistosomiasis in the area are *Biomphalaria alexandrina alexandrina*, and *Bulinus truncatus*, although *Bulinus forskali* and *Lymnaea natalensis* are also present in the very large snail population in the area which covers 1,000,000 acres and 5,000 km. of irrigation canals. An eradication campaign was started in mid-November, 1955 and carried on until early in April, 1956. It included (i) copper sulphate treatment at 30 p.p.m. for 24 hours; (ii) after sulphation, a chemical barrier of copper sulphate at 0.125 p.p.m. at all intakes together with mechanical traps at certain sites; and (iii) the treatment of infected persons [details are not given]. The cost worked out at approximately seven shillings per head of population. The method will be applied to the Managil extension. W.K.D.

249—Laboratory Practice. London.

- a. PARFITT, J. W., 1958.—“A technique for the enumeration of helminth eggs and protozoan cysts in faeces from farm animals in Britain.” **7** (6), 353–355.

(249a) Parfitt describes a four-stage technique for routine examination of faeces from farm animals. Stage I: 3 gm. of faeces are made up to 45 ml. with water, broken up by shaking with glass balls and sieved to remove coarse debris. A 15.5 ml. sample of the sieved fluid is centrifuged at 1,500 r.p.m. for two minutes and the sediment is resuspended in saturated common salt solution. Eggs and cysts of the common gastro-intestinal parasites are counted in a McMaster slide. Each egg or cyst in 0.15 ml. is multiplied by 100 to give the total number

of eggs per gm. In Stage II 15 ml. of fluid remaining from Stage I is subjected to centrifugal flotation in brine. This stage gives a more accurate count of nematode eggs in light infections. Each egg represents 1 per gm. of faeces. In Stage III fluid from Stage II is centrifuged at 1,500 r.p.m. for two minutes and the sediment is resuspended in zinc sulphate solution (S.G. 1.4) and a sample is examined in a McMaster slide for cysts of *Balantidium*. Stage IV is a centrifugal flotation in zinc sulphate solution. Fluke eggs and *Balantidium* cysts recovered at this stage are resuspended in water for examination to correct distortion caused by the zinc sulphate solution. J.E.D.K.

250—Lancet.

- a. ANON., 1958.—“Ocular lesions in onchocerciasis.” [Annotation.] Year 1958, 1 (7031), 1165–1166.
- b. FORSYTH, D. M., 1958.—“Post-schistosomal uropathy.” Year 1958, 2 (7054), 990–992.

(250a) The author discusses recent work on the specific aetiology of the ocular lesions in onchocerciasis with particular reference to the fundus lesion, which may be a form of dominantly inherited, generalized, choroidal sclerosis. If this is correct the reputation of onchocerciasis as a blinding affection has little justification. J.M.W.

(250b) Forsyth points out that post-schistosomal uropathy, following such damage to the urinary tract during the active phase of schistosomiasis haematobia that it has become liable to recurrent pyogenic infection, is a common condition. Six illustrative cases encountered in Kuwait (although the infection was contracted elsewhere) are described. The syndrome may simulate the symptoms of the primary disease and should always be considered in cases of apparent relapse or re-infection. Specific anti-schistosomal treatment should not be given unless viable ova are present in the urine. Prognosis in severe or advanced cases is poor. J.M.W.

251—Lantmannen.

- a. SMEDGÅRD, G., 1958.—“Havrenematoden måste bekämpas.” 69, 977–979.

(251a) Attacks by the oat nematode have been severe in 1958 in some places in south Sweden. Field trials were carried out with spring wheat, barley and oats, 10 varieties of each species. Differences in susceptibility between oat varieties were found—Sun II gave a better result than other varieties. The Danish barley variety Drost was very resistant. Spring wheat was severely attacked and no real differences between varieties were found. To control the nematode a well planned crop rotation is recommended. Spread of nematodes by common use of farm equipment must be prevented and nematode attacks in a field should be observed as early as possible. Intensified breeding for resistance has been initiated. S.B.

252—Medical Journal of Australia.

- a. SANDARS, D. F., 1958.—“*Taenia solium*, the pork tapeworm, in Australia.” 45th Year, 1 (18), 607–608.
- b. MACKERRAS, M. J., 1958.—“The decline of filariasis in Queensland.” 45th Year, 1 (21), 702–704.

(252a) An Australian immigrant was rid of a *Taenia solium* infection, acquired in his native Sicily, by oral administration of 1 gm. of atebirin hydrochloride given in conjunction with purges and bicarbonate of soda. There are seven previous Australian records of this infection in man and two in pigs. Sandars suggests that its spread be prevented by screening immigrants from endemic areas and by making *T. solium* infection a notifiable disease. M.MCK.

(252b) A survey of the night blood of 1,852 persons in many localities in coastal Queensland revealed only two asymptomatic carriers of *Wuchereria bancrofti*. This indicates a sharp decline in the incidence of filariasis compared with that observed 50 years ago. M.MCK.

253—Medicina. Revista Mexicana.

- a. SANTOS, A. G. DE LOS, 1958.—“Sobre un sequendo caso de parasitación por *Dipylidium caninum* (Linnaeus) en México.” **38** (787), 9–10.
- b. MAZZOTTI, L., SANTOS, A. G. DE LOS & DÍAZ MUÑOZ, A., 1958.—“Tratamiento de la infección por *Hymenolepis nana* con el compuesto Ro 2-5655/3.” **38** (799), 289–291.
- c. MAZZOTTI, L., GONZÁLEZ BARRANCO, D. & ARREDONDO, A., 1958.—“Alteraciones morfológicas en los huevos de *Trichuris trichiura* de pacientes tratados con ‘Dithiazanine’ (yoduro de 3-3’dietiltiadicarbocianina).” **38** (800), 332–335. [English summary p. 335.]

(253b) Mazzotti *et al.* report on clinical trials of a new compound (Roche—Ro 2-5655/3) stated to be ammonium chloride monohydrate (oxyphenylcarbamyimethyl) against *Hymenolepis nana*. The drug was administered orally in divided doses t.d.s. at the rate of approximately 40 mg. per kg. body-weight per day, to adults. Toxic side effects included colic and intense diarrhoea. These were eliminated by reduction of the adult dose to 20 mg. per kg. administered over six days. The cure rate was 77.4%. N.J.

(253c) When patients were being treated for *Trichuris trichiura* infections with dithiazanine 1% to 8% of the voided eggs showed deformities such as bulges, wrinkles and alterations at the poles. Of 48 female worms voided by the patients, only 17 had fully formed eggs in the uterus, and these eggs seemed to be reduced in numbers. It is therefore suggested that as a result of treatment the worms expel the fully developed eggs from the uterus and are incapable of producing further fully formed eggs. M.MCK.

254—Medicina Tropical. Madrid.

- a. PRIETO LORENZO, A., 1958.—“La lucha contra la anquilostomiasis en Portugal.” **31** (4), 297–317.
- b. PRIETO LORENZO, A., 1958.—“Los artrópodos vectores de enfermedades infecciosas y parasitarias en el hombre.” **31** (5/6), 426–455; **32** (1/2), 29–76; **32** (3), 139–193.

(254a) This is a report of a visit to Portugal made on behalf of the World Health Organization to see the progress made in combatting ancylostomiasis. In two coal-mining areas a previous high incidence, especially in underground workers, has been reduced markedly; but in certain rural areas there is still quite a high incidence due to the habit of going barefoot and the use of nightsoil for manure. In one area both ancylostome and *Necator* infections occur and the latter, originally imported from Brazil, is now autochthonous. The campaign has followed the usual measures. Treatment with tetrachlorethylene has met with resistance because of side effects, and hexylresorcinol has been advised instead. Apparently at the present time ancylostomiasis does not constitute an important problem in Portugal. W.K.D.

(254b) This is a very long general review of the role played by the Arthropoda in the transmission of disease with special reference to man. Beyond brief mention of the parts played by the Simuliidae, Anophelinae, and Culicinae in the transmission of various filarial diseases there is little of interest to the helminthologist, the article being mainly directed to the post-graduate student of tropical diseases. W.K.D.

255—Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow.

- a. EDELSTEIN, I. A., 1958.—[The part played by interoception in the mechanism of intoxication by *Ascaris*.] **27** (4), 408–414. [In Russian: English summary p. 414.]

(255a) Edelstein has shown, on dogs and cats, that in helminth intoxications the action of toxins on the host through the interoceptors is important. Aqueous extract of ascarids, when injected into the lumen or blood vessels of the isolated host intestine, connected to the animal by nerves only, was followed by an increase in arterial blood pressure sometimes with intervals of considerable fall and an increase in the frequency and amplitude of respiration. G.I.P.

255—Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow (cont.)

- b. SAVCHENKO, L. P., 1958.—[Infection with intestinal worms in the aetiology and the course of epileptic fits in children.] **27** (4), 414–419. [In Russian: English summary p. 419.]
- c. LINDTROP, G. T., KHORAVA, G. V. & INGULSKAYA, I. I., 1958.—[Influence of concomitant helminthiases on the progress of typhoid fever and problems of anthelmintic treatment during infectious diseases.] **27** (4), 419–422. [In Russian: English summary p. 422.]
- d. EVDOKIMOVA, S. V., 1958.—[Application of piperazine sulphate and chenopodium oil during the treatment of ascariasis.] **27** (4), 422–424. [In Russian: English summary p. 424.]
- e. KELLINA, O. I., 1958.—[Side effects caused by piperazine treatment. Review of literature.] **27** (4), 424–432. [In Russian.]
- f. TAREEVA, A. I., 1958.—[The action of the alkaloid gentianin in suppressing intestinal parasitic worms and its toxicity.] **27** (4), 432–434. [In Russian: English summary p. 434.]
- g. SAVCHENKO, V. S., 1958.—[Examination of anthelmintic fractions of certain ethereal oils. Second report.] **27** (4), 435–438. [In Russian: English summary p. 438.]
- h. OZERETSKOVSKAYA, N. N., CHOCHIEVA, Z. R. & KIYASHKO, N. T., 1958.—[Serious cases of opisthorchiasis.] **27** (4), 439–445. [In Russian: English summary p. 445.]
- i. MALIGIN, S. A., 1958.—[A cutaneous form of strongyloidiasis caused by larvae of *S. ransomi*, *S. westeri* and *S. papillosus*.] **27** (4), 446–447. [In Russian: English summary p. 447.]
- j. CHUN-SYUN, F., 1958.—[Two cases of trichinellosis in Kazakhstan caused by the meat of boar (*Sus scrofa*).] **27** (4), 447–449. [In Russian: English summary p. 449.]
- k. KRAFT, I. A., 1958.—[Rupture of an intrahepatic bile duct with the development of a bile fistula in the retroperitoneal cellular tissue in a case of opisthorchiasis.] **27** (4), 449–450. [In Russian.]
- l. SKRINNIK, M. R., LIKHOTINSKAYA, M. V. & OCHERET, A. M., 1958.—[A case of *Macracanthorhynchus* infection in man.] **27** (4), 450–451. [In Russian.]

(255b) Helminth infections (ascariasis, trichuriasis and enterobiasis) may cause epileptic fits in children with weaknesses in the central nervous system, although the fits are not always in proportion to the intensity of infection. These fits contrast with those of other aetiology and also show some variability depending on the parasite involved. In many cases timely worming effectively removes the symptoms. G.I.P.

(255f) Gentianin (prepared from *Gentiana kirillowii*) when administered to cats in single doses ranging from 75 mg. to 200 mg. per kg. body-weight on an empty stomach, cured or reduced *Toxocara mystax* infections in 15 of the 16 animals treated, but was ineffective against *Hydatigera taeniaeformis* and *Dipylidium caninum*. The only side effect was vomiting in five cats. The toxicity of gentianin is insignificant, the average lethal dose to mice being 1.3 gm. per kg. body-weight. G.I.P.

(255g) Savchenko supplements by graphic data his earlier results [for abstract see Helm. Abs., 23, No. 286b] on the rapid depressive effect of linalool and carvone on the activity of pig ascarids *in vitro* and the lack of a similar depression with anethole and cineole. These results have led to experiments on the treatment of *Toxocara canis* in dogs. Linalool in gelatin capsules was given orally at a dose of 0.1 gm. per kg. body-weight three times daily at one-hour intervals for three consecutive days. The capsules were pre-treated with formalin vapour to prevent their disintegration before they reached the intestine, this also leading to the alleviation of side effects. The intensity of infection in the seven dogs treated was reduced by 86.6%, five being fully cured. Carvone, similarly administered to five dogs, reduced intensities by 52.6% and cured only one. G.I.P.

(255i) During experimental infection of animals with larvae of *Strongyloides* the author's hands became repeatedly infected resulting in a local inflammation. Such contamination is prevented by the use of gloves. G.I.P.

(255l) *Macracanthorhynchus hirudinaceus* is reported from man. One specimen was passed by a five-year-old boy following treatment with sankafen (for ascariasis). The boy was known to catch and squash beetles, the larvae of which are the intermediate hosts of this acanthocephalan. G.I.P.

255—Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow (cont.)

- m. KOSMACHEVSKI, V. V., BONDAREVA, N. V. & SAVICH, T. E., 1958.—[The course of trichinelliasis.] **27** (4), 492. [In Russian.]
- n. MAKHMUDOVA, S. A., 1958.—[The mechanism of the action of acrichin on taeniasis.] **27** (4), 493. [In Russian.]
- o. VILLAKO, K., KHANGE, L., KHANSON, K. & LEEPER, M., 1958.—[Blood changes during *Diphyllobothrium* infection.] **27** (4), 494. [In Russian.]
- p. EPSHTEIN, S. I. & YATSENKO, K. S., 1958.—[Two local cases of opisthorchiasis in Astrakhan.] **27** (4), 494–495. [In Russian.]
- q. MELNIKOV, P. P., 1958.—[Two cases of strongyloidiasis.] **27** (4), 495–496. [In Russian.]
- r. KITAIEV, Y. M., 1958.—[Death by asphyxiation caused by *Ascaris* in the respiratory tract.] **27** (4), 496. [In Russian.]
- s. GALYAMINA, V. D., 1958.—[*Diphyllobothrium* infection among the population of Kuybyshev.] **27** (4), 497. [In Russian.]
- t. LEVIT, M. S. & PUGACHEVSKAYA, E. F., 1958.—[The incidence of echinococcosis in Kiev.] **27** (4), 497–498. [In Russian.]
- u. MOSHKOVSKI, S. D., 1958.—[Main features of the epidemiology of helminth diseases.] **27** (5), 516–524. [In Russian: English summary p. 524.]
- v. PODYAPOLSKAYA, V. P., 1958.—[Features peculiar to the epidemiology of ascariasis and trichuriasis.] **27** (5), 524–529. [In Russian: English summary p. 529.]
- w. KHOMCHENKO, S. I., 1958.—[Analyses of monthly curves of the incidence of ascariasis and an attempt at prognosis of the disease.] **27** (5), 530–546. [In Russian.]
- x. ISAEV, L. M., 1958.—[Dates and frequency of mass treatment in the foci of ascariasis.] **27** (5), 546–555. [In Russian: English summary pp. 554–555.]
- y. MARUASHVILI, G. M., GORDADZE, G. N., GVINIASHVILI, S. P., POLOVETSKAYA, A. A., ZENAISHVILI, O. P. & GABUNIYA, L. V., 1958.—[Results of measures for the eradication of ascariasis in the Telavi district.] **27** (5), 555–561. [In Russian: English summary pp. 560–561.]
- z. MUKVOZ, L. G., 1958.—[Long term experience in elimination of helminths in children of Zaporozhye.] **27** (5), 561–566. [In Russian: English summary pp. 565–566.]

(255m) The authors describe the course and symptoms of trichinelliasis basing their work on a study of 200 cases, 29% of which were heavy infections. They observed asymptomatic infections in persons taking alcohol with infected pork, and ascribe this to a depressed secretory activity of the stomach allowing the cysts to be passed through the gut. G.I.P.

(255n) Makhmudova has studied the action of acrichin (atebrin) on taeniasis in 56 patients. During the nine days following a single dose of eight tablets each containing 0.2 [gm.] of acrichin, the concentration of acrichin in the blood of the patients fluctuated from 2.5 to 10 mg.%, but in some only traces or none was present. Three daily doses of 0.1 [gm.] for seven days gave similar results. The proglottides passed contained from 2 to 10 mg.% of acrichin independently of their maturity. The scoleces showed signs of dilatation and destruction of the nerve tissue, as after the treatment with male fern extract. G.I.P.

(255v) The principal differences in the epidemiological distribution of *Ascaris* and *Trichuris* in man, which on the whole are similar, are here discussed in relation to Russia and are (i) the more northward boundary of ascariasis, (ii) the greater frequency and intensity of *Ascaris* infection in temperature zones, (iii) equalization or even reversal of this trend in subtropical and tropical zones and (iv) absence of ascariasis in arid and hot regions where the spread of trichuriasis is moderate or insignificant. G.I.P.

(255y) The Telavi district, incorporating one town and fifteen village councils, was hyperendemic for ascariasis mainly due to bad sewage arrangements. Organization of control measures for the whole district with the participation of all medical workers and involving mass treatment of the population, sanitary measures and hygiene instruction, resulted in a reduction of infection from 82% in 1955 to 18.5% at the end of 1957 with a good prospect of eradication by 1959. G.I.P.

255—Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow (cont.)

- ba. SHIKHOBALOVA, N. P., VASILKOVA, Z. G. & SHEKHTMAN, Y. L., 1958.—[A study on radio-sensitivity of eggs of *Ascaris lumbricoides* and *Ascaris suum*, and viability of the larvae.] 27 (5), 566–571. [In Russian: English summary pp. 570–571.]
- bb. BOGDANOVICH, V. V., 1958.—[Pathological changes in the organs of the host during the first stages of migration of *Ascaris* larvae.] 27 (5), 571–572. [In Russian: English summary p. 572.]
- bc. SUSLOV, I. M., 1958.—[The biology of *Hymenolepis fraterna*.] 27 (5), 573–575. [In Russian: English summary p. 575.]
- bd. GLIKINA, E. L. & BEREZENTSEVA, G. F., 1958.—[The accumulation and distribution of glycogen in *Trichuris vulpis* (Fröhlich, 1789).] 27 (5), 575–577. [In Russian.]
- be. SHEVKUNOVA, E. A., 1958.—[On the possibility of repeated infestations of the mucosa in mammals with *Limnatis nilotica*.] 27 (5), 577–580. [In Russian: English summary p. 580.]
- bf. SHEVKUNOVA, E. A. & PCHELKINA, A. A., 1958.—[Experimental infection of the medicinal leech with the causative agent of Q fever.] 27 (6), 699–701. [In Russian.]

(255ba) The effect of irradiation with X-rays or gamma rays from Co⁶⁰ of *Ascaris lumbricoides* and *A. suum* eggs before cleavage depended on the irradiation dose. 100% to 60% of larvae developed to the infective stage after irradiation with 2,000 to 15,000 roentgen, 5–26% developed after 30,000 roentgen and all eggs were killed by 40,000 roentgen of X-rays, gamma rays being somewhat less effective. The development of larvae was generally retarded (evident already at 7,000 roentgen) and those that did develop were less infective, considerably smaller numbers reaching the liver and lungs of experimentally infected white mice than in the controls which had received non-irradiated larvae. G.I.P.

(255bb) During the first hours after experimental infection of rats with *Ascaris* the larvae penetrate into the base of crypts of the intestinal mucosa. The crypts turn into cyst-like cavities filled with disrupted epithelial cells and cells migrated from the blood and connective tissue, which later turn into a homogeneous mass. Oedema forms in the submucosa and larvae reaching this layer become surrounded by an abundant cellular infiltrate rich in eosinophils. G.I.P.

(255bc) To see if intra-intestinal auto-infection with *Hymenolepis fraterna* was possible, Suslov used experimentally infected white mice in which development of immunity to hyperinfection was prevented by the removal of the spleen and induced staphylococcal sepsis. On autopsy 68 to 96 days after a second infection, 55 out of 113 mice contained cysticercoids in the proximal portion of the small intestine as well as mature worms in the distal end. Thus, although the conditions for an auto-infection were prevalent (i.e. occurrence of hyperinfection), this had not taken place as there were no cysticercoids near the adult worms. G.I.P.

(255bd) In *Trichuris vulpis*, the glycogen was distributed in the muscles and the male and female genital cells, but was absent from the cuticle, digestive tract and pseudocoel mesenchyme. In the muscle cell, the cytoplasm was densely filled with particles and aggregations of glycogen, a few particles being also present in the fibril process. In young egg cells the glycogen was evenly distributed through the cytoplasm with a few aggregations around the nucleus, it increased in amount with the development of the cell to form large angular aggregations in mature eggs within the uterus. G.I.P.

(255be) Young *Limnatis nilotica* were shown experimentally to be readily parasitic in the respiratory passages of mammals (dogs and rabbits) where they grow to their adult size but do not reach maturity. Leeches which had passed through a period in the mammal, refused to feed on mammalian mucosa (except a few extremely hungry ones which fed for short periods), but all readily entered and fed on frogs even one month after leaving the mammal. Shevkunova explains this behaviour by the different temperature requirements of the leech at the various stages in its development. G.I.P.

(255bf) *Hirudo medicinalis*, infected with *Rickettsia burneti* through feeding on infected guinea-pigs or injection of egg cultures, were allowed, 2 to 53 days later, to feed on healthy guinea-pigs. The infection was successful in 12 out of 14 experiments showing that the leeches were able to harbour *R. burneti* for long periods without decreasing their infectivity (the experiment did not test periods longer than 53 days) and to act as carriers of Q fever. G.I.P.

255—Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow (cont.)

- bg. OZERETSKOVSKAYA, N. N., 1958.—[Treatment of trichinelliasis with steroid hormones. (Review of the literature).] **27** (6), 710–716. [In Russian.]
- bh. SHMELEVA, V. S., 1958.—[The influence of ascariasis on the course of dysentery.] **27** (6), 716–718. [In Russian.]
- bi. DALIN, M. V., MATS, A. N. & MARKOVICH, I. N., 1958.—[Influence of vitamin B₁ (thiamine) on the development of immunity to ascariasis.] **27** (6), 718–723. [In Russian: English summary pp. 722–723.]
- bj. SHARKOVA, K. D., 1958.—[Experience of collective work of parasitological departments and those of prophylactic disinfection in Stalingrad.] **27** (6), 728–729. [In Russian.]
- bk. KHRISTIN, L. I., 1958.—[Influence of anthelmintic treatment on the course of skin diseases.] **27** (6), 739. [In Russian.]

(255bh) In dysentery patients with ascariasis, as compared to those without, abnormal temperature and stools lasted longer, severe damage of the intestinal mucosa was more frequent, the patient took longer to cure and relapses occurred more often. Oxygen therapy proved effective without side effects. G.I.P.

(255bi) Deficiency of vitamin B₁ in mice caused *Ascaris lumbricoides* infections to be more frequently lethal and depressed macrophagic reaction in affected organs. Hypervitaminosis in guinea-pigs stimulated antibody production which was associated with a lowering in activity of serum cholinesterase. It also produced higher increases in weight in both infected and non-infected animals. G.I.P.

(255bk) Under observation were 200 adults and children in whom various dermatoses (eczema, lupus, scrofuloderma, psoriasis etc.) occurred together with ascariasis; 20 suffered also with trichuriasis and five with enterobiasis. Following a successful anthelmintic treatment, the inflammatory processes abated and the general condition improved in 44. G.I.P.

256—Medycyna Weterynaryjna.

- a. CHILIMONIUK, J., 1958.—“Cztery przypadki strongyloidozy źrebiąt.” **14** (3), 169.
- b. PROST, M., 1958.—“Badania nad zastosowaniem roślinnych fermentów proteolitycznych przy glistnicy u kur.” **14** (6), 326–329. [English & Russian summaries pp. 328–329.]
- c. CHOWANIEC, W., DRÓZDZ, J. & WERTEJUK, M., 1958.—“Próby kompleksowego zwalczania motyli wątrobowej u bydła w województwie rzeszowskim.” **14** (7), 388–392. [English & Russian summaries p. 392.]
- d. PRUSKI, S. & KORDA, P., 1958.—“Stosowanie ‘Antiverminy’ przy glistnicy u szympansa.” **14** (7), 421–422.
- e. MALCZEWSKI, A., 1958.—“Robaczycza płuc u bydła.” **14** (9), 515–519.
- f. KOSSAKOWSKI, S. & GRABOWIEC, S., 1958.—“Adipinian piperazyny w leczeniu psów chorych na robaczycę.” **14** (9), 550–553.

(256a) Noting the efficacy of gentian violet against strongyloidiasis in pigs, Chilimoniuk uses a solution of 2 [gm.] of gentian violet and 100 [gm.] sodium sulphate in one litre of water per animal to treat *Strongyloides westeri* in three foals aged two to three months. The first foal was cured by the naso-pharyngeal intubation of this solution in association with three arecoline injections and the second by the solution alone, which however was ineffective in the third foal with a heavy worm burden. G.I.P.

(256b) Nematolyt and vermizym as 4% aqueous suspensions exhibited a digestive action on *Ascaridia galli* in vitro, the entire worm having disintegrated after 24 hours. In tests on 111 experimentally infected domestic fowls of the Sussex variety the following results were obtained. Vermizym in single doses of 1.0 gm. to 2.5 gm. per kg. body-weight cured 24% to 47% of birds, as a single dose of 7.0 gm. per kg. only 20%, as three successive daily doses of 1.0 gm. to 3 gm. per kg. it cured 50% to 60%, and nematolyt as a single dose of 1.0 gm. per kg. cured 57%. The treatment was preceded by a 24-hour protein-free diet. The two enzymes cannot be recommended due to their low efficacy, but the absence of toxicity leaves the way open to other papain-like substances. G.I.P.

(256c) Two cattle-farming areas in the Rzeszów district of Poland, which were heavily affected by liver-flukes, were used to test a plan of control which consisted of (i) mass treatment of cattle in March, August and November using English hexachlorethane products, (ii) spraying of pastures to eradicate the snail population in April, possibly in July, and in October using copper sulphate in 1% solution, and (iii) improvement of pasture drainage. The periods of treatment were calculated in relation to the local season of snail breeding and cattle pasturing. In one year, the infection was reduced from 60% to 5%. G.I.P.

(256d) A young chimpanzee (*Pan troglodytes*) in the Warsaw Zoo was treated for ascarids with a Polish preparation of piperazine adipate, Antivermina, given thrice daily for four consecutive days, the dosage being 0.1 [gm.] per kg. body-weight per day. A large number of worms were passed chiefly on the fourth day of the treatment. The treatment was repeated on reappearance of a mild infection after six months. Thus piperazine adipate, being effective and also non-toxic and easily administered in food can be successfully used against helminths in monkeys. G.I.P.

(256e) Malczewski, from his own observations and a review of foreign literature mainly from England, briefly describes the biology and pathology of *Dictyocaulus viviparus* in cattle. He gives an account of the symptoms and pathological changes in the lungs observed on examination of large numbers of cattle in the Elblag slaughterhouse; about 3% of adult and from 20% to 43% of young cattle were infected at various times. G.I.P.

(256f) Kossakowski & Grabowiec, wishing to find an easily administered and non-toxic treatment for helminths in sheepdogs, have tested piperazine adipate. A single dose of 150 mg. per kg. body-weight cured 13 out of 15 dogs with *Toxocara canis* and *Toxascaris leonina* and three out of eight with *Uncinaria stenocephala*; while two such doses with a day's interval cured, respectively, all 16 dogs of *T. leonina* and *Toxocara canis* and five out of nine of *U. stenocephala*. The treatment was ineffective against *Trichuris vulpis*. G.I.P.

257—Mémoires de la Société Vaudoise des Sciences Naturelles.

- a. ALTHERR, E., 1958.—“Nématodes du bassin inférieur de la Weser et des dunes d'Héligoland. Espèces nouvelles ou incomplètement décrites.” **12** (2), 45–63.

(257a) Altherr describes and figures the following: *Bathylaimus latisetosus* n.sp. (juvenile female) differing from *B. tenuicaudatus* in the more pointed tail, longer cephalic setae and the presence of six (not four) labial papillae; *Trilobus husmani* n.sp. (female and male) differs from the female of *T. allophysis* in being longer and narrower, having a more posterior vulva and in the length of the buccal cavity; *Mononchus kastrolli* n.sp. (female and male) is differentiated in tabular form from *M. major* and *M. gerlachei*, particularly by having a shorter tail, more anterior nerve ring and bigger spicules; *Labronema fluviatilis* n.sp. (male) may be the male of *Dorylaimus* (*Labronema*?) *exilicaudatus* Altherr, 1953 and it differs from *D. balticus* by the non-digitate tail, double spear guide and less angular lips; *Dorylaimus arenicola* n.sp. (female and male) differs from *D. obtusicaudatus* by the shorter spicules, non-stratified tail and more slender spear; *Nygolaimus macrospiculum* n.sp. (female and male) is distinguished by the very large spicules; *Xiphinema paraelongatus* n.sp. (female and male) [spelt *Xyphinema*] differs from *X. diversicaudatum* by being longer, having a longer spear and longer and more curved spicules. *Dorylaimus balticus* Schulz, 1935, *Sporonchulus schulzi* Meyl, 1955 (which is illustrated) and *Mylonchulus* (?) *subtemuis* are also commented upon. J.B.G.

258—Monatshefte für Veterinärmedizin.

- a. BORCHERT, A., 1958.—“Über Erkennung, Bekämpfung und Vorbeuge der Magenfadewurm-, Lungenwurm- und Leberegelkrankheit der Wiederkäuer.” **13** (1), 10–16.
b. RAUCHBACH, K., 1958.—“Beitrag zur Therapie der Thelaziosis der Rinder.” **13** (7), 207–209.

(258a) Borchert describes the salient features of trichostrongyle, lungworm and liver-fluke infections of ruminants with special reference to diagnostic techniques and differential

diagnosis. In all three infections anthelmintic treatment should go hand in hand with prophylactic measures designed to interrupt the parasites' life-cycles. In the case of liver-fluke the importance of chemical attack on the snail intermediary is stressed. A.E.F.

(258b) Rauchbach reports that the usual method of treating *Thelazia* infection in cattle, by injecting an iodine solution into the conjunctival sac, is not satisfactory since it does not reach parasites in the naso-lachrymal canal and is not effective against species other than *T. rhodesii*. He describes a specially designed canula 10 cm. in length and 2 mm. to 3 mm. in diameter which can be inserted into the naso-lachrymal canal and through which fluid can be injected into the conjunctival sac and under the nictitating membrane. This method has been used successfully in 25 animals and is recommended for the treatment of thelaziasis. A.E.F.

259—Nachrichtenblatt des Deutschen Pflanzenschutzdienstes. Stuttgart.

- a. NUBER, K., 1958.—“Über die Beteiligung des Hopfen-Zystenälchens (*Heterodera humuli* Filipjev) an Misswucherscheinungen des Hopfens im Bodenseegebiet.” 10 (7), 103-104.
- b. HAHN, S., 1958.—“Wurzelgallenälchen (*Meloidogyne hapla* Chitw.) als Freilandschädlinge an Salat und Möhren.” 10 (8), 123-126. [English summary p. 126.]

(259a) Soil samples from fields in which diseased hops were growing revealed the presence of *Heterodera humuli*. No correlation was found between the numbers of cysts and the presence of the disease and Nuber concludes that some other factor produces the disease symptoms in the hops. H.R.W.

(259b) Root-knot disease due to *Meloidogyne hapla* has been found in the field in two places in Germany on lettuce and carrots. At Giessen, in light sandy soil, two successive crops of lettuce in one season were heavily infested but a third crop sown on 22nd September did not become galled. Treatment of the soil with 100 c.c. Vapam per sq.m. in March was more effective than with 90 c.c. of D-D in October. The Vapam proved toxic to lettuces planted four weeks after treatment but the toxicity had disappeared nine days later. On fields near Mainz up to 10% of carrots were galled. Similar nematocidal treatments reduced galling on the subsequent carrot crop: the yield was reduced on the Vapam plot and increased on the D-D plot as compared with the untreated plot. It was observed that female *M. hapla* from lettuce roots were on the average much bigger than those from carrots, clover, peas and a number of other plants. It is thought that this nematode is much more wide-spread than has been realized. M.T.F.

260—Nature. London.

- a. DAWES, B., 1958.—“*Sagitta* as a host of larval trematodes, including a new and unique type of cercaria.” [Correspondence.] 182 (4640), 960-961.
- b. DAWES, B. & GRIFFITHS, I., 1958.—“The enigmatical trematode ‘*Dictyocotyle coeliaca*.’” [Correspondence.] 182 (4641), 1033-1034.

(260a) Dawes records that two specimens of *Sagitta tenuis*, collected by the Rosaura expedition, were infected with a small appendiculate hemiurid (probably *Hemiuris* sp.) and a very young larval cestode respectively. He also describes and illustrates a new type of cercaria, identical with the forms described as *Metacercaria owreae*, which has two cylindrical posterior appendages with rounded distal extremities and very narrow connections with the body; 15 of these larvae were collected from 13 *Sagitta hexaptera* from the Caribbean. Notable also were six very short and rudimentary diverticula which formed a kind of rosette at the tip of each caecum. The systematic position and possible life-history is discussed. S.W.

(260b) Dawes & Griffiths discuss *Dictyocotyle coeliaca*. Over a period of five years 38 additional specimens were collected from *Raia radiata* at Plymouth; these were located in the anterior part of the liver (27), the vicinity of the kidneys (3) and the body-cavity near the openings of the abdominal canals (7). One specimen, which had lost the opisthaptor, was found in an abdominal canal. As six isolated opisthaptors and 317 entire specimens of

Calicotyle kroyeri were found in the cloaca the authors consider *D. coeliaca* to be simply "a coelomic form of *Calicotyle* which has entered the body cavity via one of the abdominal pores, which has lost the normal opisthaptor, and which has afterwards modified the central boss by regeneration in such a manner as to produce a delicate hookless disc without true loculi, that is, a pseudohaptor". They discuss the histological findings which support their conclusions and illustrate the paper with three photomicrographs. S.W.

261—Nauchnie Trudi. Ukrainski Nauchno-Issledovatel'ski Institut Eksperimentalnoi Veterinarii.

- a. KLESOV, M. D. & POPOVA, Z. G., 1958.—[Testing of prophylactic methods against *Dicrocoelium* in sheep.] **24**, 225–240. [In Russian.]
- b. POPOVA, Z. G., SOBETSKAYA, A. T. & SIRENKO, T. T., 1958.—[Experimental control of helminth infections of domestic fowls on collective farms in the Putivl region.] **24**, 241–245. [In Russian.]

(261a) Klesov & Popova discuss the possible prophylaxis of *Dicrocoelium dendriticum* infection in sheep. Destruction of the terrestrial snail and ant intermediate hosts by chemical means was not successful. However, the snail hosts were effectively eliminated within ten days by the introduction of chickens on to the pastures. Sheep grazed on lucerne instead of grass remained free of infection. N.J.

(261b) Popova *et al.* report on the experimental control of helminth infections of domestic fowls on collective farms in the Putivl region. Over 1,000 chickens on 21 farms were the subjects of investigation. *Ascaridia* infections were found on all the farms, *Capillaria* infections on 12 farms and *Heterakis* infections on six farms. 2 gm. to 2.2 gm. of phenothiazine per kg. body-weight was administered in food as a therapeutic measure. After treatment, older birds on some of the farms still showed 2.2% to 6.6% *Ascaridia* infections, 2% to 3% of birds on three farms were still infected with *Heterakis*, while on one farm 27.7% of surviving *Capillaria* infections were noted. During the examination of young chickens in the autumn, *Ascaridia* infections were found to be absent on some farms and their incidence much lowered on the others; no *Heterakis* infections were noted; while 2% to 16% of birds on four farms showed the presence of *Capillaria*. Phenothiazine had no side effects. N.J.

262—Nematologica.

- a. BROWN, E. B., 1958.—"Pea root eelworm in the eastern counties of England." **3** (4), 257–268. [German summary p. 268.]
- b. SIMON, L., 1958.—"Nematologische Untersuchungen an Hopfen. II. Zur Morphologie und Biologie von *Heterodera humuli* Filipjev, 1934." **3** (4), 269–273. [English summary p. 273.]
- c. HESLING, J. J., 1958.—"*Heterodera major* O. Schmidt, 1930—population changes in the field and in pots of fallow soil." **3** (4), 274–282. [German summary p. 281.]
- d. VAN GUNDY, S. D., 1958.—"The life history of the citrus nematode, *Tylenchulus semi-penetrans* Cobb." **3** (4), 283–294. [German summary p. 293.]
- e. ANDRÁSSY, I., 1958.—"*Diplogaster lepidus* n.sp. und der Schlüssel der *Diplogaster*-Arten von unpaarigem Ovar." **3** (4), 295–300. [English summary p. 300.]
- f. LOOF, P. A. A., 1958.—"Some remarks on the status of the subfamily Dolichodorinae, with description of *Macrotrophurus arbuticola* n.g., n.sp. (Nematoda: Tylenchidae)." **3** (4), 301–307. [German summary pp. 306–307.]
- g. WIDDOWSON, E., DONCASTER, C. C. & FENWICK, D. W., 1958.—"Observations on the development of *Heterodera rostochiensis* Woll. in sterile root cultures." **3** (4), 308–314. [German summary p. 313.]
- h. WINNER, C., 1958.—"Untersuchungen über die Eigenschaften der auf *Heterodera schachtii* Schmidt aktivierend wirkenden Wurzelexsudate von *Brassica rapa oleifera* D.C." **3** (4), 315–326. [English summary pp. 325–326.]
- i. WHITEHEAD, A. G., 1958.—"*Rotylenchoides brevis* n.g., n.sp. (Rotylenchoidinae n.subfam.: Tylenchida)." **3** (4), 327–331. [French summary p. 331.]
- j. MARTIN, G. C., 1958.—"Root-knot nematodes (*Meloidogyne* spp.) in the Federation of Rhodesia and Nyasaland." **3** (4), 332–349. [German summary p. 348.]

(262a) Surveying the occurrence of pea root eelworm, *Heterodera göttingiana* Lieb., in the Eastern Counties, Brown has tried to find an explanation for the failure of pea crops on

land where very few host crops have been grown over a number of years preceding the attacks. The cropping histories of numerous fields in which peas have failed are listed. Acreage figures for peas and field beans on a parish basis for East Suffolk for three specimen years, 1869, 1890 and 1910 are mapped out and the distribution of present-day infestations compared with intensive cropping over this period. Population fluctuations estimated on intensive soil sampling of a number of small fields following pea failure are illustrated graphically and show that the rate of fall of populations under non-host or fallow is equivalent to that in other *Heterodera* spp. Brown concludes that the pea plant is very susceptible to *H. göttingiana* and that populations may have been built up many years ago on field beans, which are not such a good indicator of the presence of the eelworm, and maintained at the danger level for peas by occasional crops of beans in recent years.

A.M.S.

(262b) Outline drawings of cysts of *Heterodera humuli* and a comparative table of measurements of cysts, larvae and eggs are given. In soil samples, larvae are found mostly in April and May but continue to occur till September. Mature cysts do not occur before the end of July. *H. humuli* occurs regularly in the hop growing centres of South Germany.

J.B.G.

(262c) The author gives details of changes in the population of *Heterodera major*, in chalky soil in southern England and in sandy soil in the west midlands, under various crops. Generally, cereals increased the eelworm population, while grasses, fallow and non-host crops reduced the eelworm population by about 60% per annum. A weekly investigation of the *H. major* population in fallow soil showed that over a period of two years the number of eggs per cyst fell in the spring and early summer, while there was little fall during the rest of the year. Numbers of cysts dropped by less than 50% in two years. After two years, the residual eelworm population increased many times on barley.

J.J.H.

(262d) Van Gundy incubated eggs of *Tylenchulus semi-penetrans* in water at 75°F. and observed hatching and development of the larvae. The first moult occurs in the egg and the sex of the larva can then be determined, the males being shorter and thicker and having a shorter oesophagus than the females. The males mature in water in a week, undergoing three moults. The second-stage female larvae failed to develop in the absence of host roots: this appears to be the most resistant stage. When inoculated on to citrus seedlings kept at 25°C. the second, third and fourth moults occurred during a three-week feeding period on the root surface and the young females then penetrated to the pericycle and matured within a week. Eggs were laid five weeks after inoculation. Reproduction was shown to take place without males. In the field free water is necessary to flush the larvae from egg masses and enable them to reach new roots.

M.T.F.

(262e) Andrassy describes and figures *Diplogaster* (*Eudiplogaster*) *lepidus* n.sp. which occurred in bacterial slime on vine shoots in Hungary. It is closest to *D. systemocerci* Körner, 1954 but differs in the annulated body, large claw-like dorsal tooth, the long post-vulval sac, the more anteriorly placed vulva and the very long, filiform tail. A key is given to the differentiation of all the monodelphic species of *Diplogaster*.

J.B.G.

(262f) Loof discusses the status of *Belonolaimus* and *Dolichodorus* and concludes that the former should be assigned to Hoplolaiminae and the latter to Tylenchinae; Dolichodorinae should be abandoned. He describes and figures *Macrotrophurus arbusticola* n.g., n.sp. This new genus belongs in the Tylenchinae; its lips are not offset and it has large amphids opening at their base; long stylet; large median bulb; elongate terminal bulb; paired, opposed, outstretched ovaries; median vulva; tail tip with thick cuticle; male with well developed bursa. It is considered closest to *Trophurus* Loof, 1957 and was found in Holland and Switzerland.

J.B.G.

(262g) A technique for infesting tomato roots with sterilized eggs and larvae of the potato-root nematode is described. The tomato seeds were sterilized by washing for 20 minutes in 5% bleaching powder solution and the nematode eggs by immersion in 20 vol. hydrogen

peroxide for from eight to 16 hours. Host seedlings were germinated and inoculated in test tubes containing White's 0.75% nutrient agar medium. Active larvae appeared round root tips four to five days after inoculation of the tubes and the majority of larval invasions occurred just behind the root tips. Third-stage larvae were found in roots at 14 days after inoculation and young adult females at about 24 days. Fully developed adult females, appearing from about the 35th day, were opened but none contained eggs and no free males were found. C.C.D.

(262h) Winner describes his techniques for producing root diffusate from rape seedlings and for testing the diffusate and purifications of it as hatching stimulants of *Heterodera schachtii*. He found the active fraction (hatching factor or factors) in the diffusate was relatively stable to boiling, adjustment to pH 1 and pH 12, vacuum concentration to dryness at 35°C., and copper sulphate treatment to precipitate proteins; but it was decomposed in a few weeks at room temperature by micro-organisms, present in the crude diffusate. The active fraction is dialysable and useful steps towards purification and identification are the use of ion exchange resins, electrophoresis and paper chromatography. The last-named method, used with a solvent mixture of s-butanol formic-acid water (75:13:12), showed peak activity to be associated with an R_f value of 0.8. Paper chromatograms of root extracts showed additional active spots not detected in root diffusate preparations, and Winner regards such extracts as more powerful and comprehensive sources of the eelworm hatching factors obtainable from rape seedling roots. R.D.W.

(262i) Whitehead describes and figures *Rotylenchoides brevis* n.g., n.sp., from banana roots in Tanganyika, for which he erects a new subfamily the Rotylenchoidinae within the Tylenchida. The nematode shows some sexual dimorphism in that the oesophagus is less developed, and its lumen was not visible, in the male. The terminal oesophageal bulb overlaps the intestine; vulva posterior with a short post-vulval sac present; prodelfic gonad short with a round spermatheca; male tail with bursa, spicules and gubernaculum similar to those of hoplolaims. Whitehead justifies the new subfamily by saying that to place the genus in Hoplolaiminae would involve the re-defining of an already compact group. J.B.G.

(262j) Martin records all the known root-knot host plants wherein species of *Meloidogyne* have been identified for the Federation of Rhodesia and Nyasaland. Some 400 plants and varieties are listed and in each case the degree of galling, the number of egg masses in relation to the galling on the roots, the number of plants examined, and the number of sites from which specimens were obtained is indicated. *Meloidogyne javanica* is the most commonly occurring species with 219 known host plants from 347 infested sites and is considered to be indigenous. Other root-knot species present in the Federation are *M. incognita* var. *acrita*, *M. hapla* and *M. arenaria*. The distribution of these three species is shown on a map of the Federation. D.J.H.

263—New Zealand Journal of Agriculture.

- a. ARMSTRONG, M. C., 1958.—"Investigation of ill-thrift of lambs in South Canterbury." **97** (3), 241, 243, 245, 247-248.
- b. DODD, D. C., 1958.—"Lamb losses from birth to 6 months." **97** (3), 265, 267-268.

(263a) Armstrong points out that ill-thrift of lambs in South Canterbury is due in part to heavy infection with *Ostertagia* spp. Farmers on similar light stony soils are therefore recommended to treat their stock with fine-particle phenothiazine; to increase the normal dose by one and a half and to repeat the drench at intervals of three weeks in the case of all unthrifty lambs; to adopt a seven-day shift on to clean, spelled feed during dull, wet weather; and to prevent lambs from foraging continually over previously used breaks of feed crops. J.M.W.

(263b) Dodd discusses some of the conditions which lead to early death of lambs. He remarks, *inter alia*, that while tapeworm infection may predispose a lamb to pulpy kidney it is not the primary cause; and that haemonchiasis is not a serious cause of losses in lambs up to six months, although a heavy infection can be lethal and should be treated by an immediate phenothiazine drench. J.M.W.

264—New Zealand Journal of Science.

- a. HIRSCH, A., 1958.—“Biological evaluation of organic pollution of New Zealand streams.” 1 (4), 500–553.

(264a) Unnamed nematodes are recorded from the rivers Waimakariri, Cam, Makerewa, Manawatu and Oroua but their occurrence in relation to pollution is not discussed. G.I.P.

265—Occasional Paper. Mauritius Sugar Industry Research Institute.

- a. WILLIAMS, J. R., 1958.—“Studies on the nematode soil fauna of sugar cane fields in Mauritius. 1. The genus *Mononchus* (Trilobidae, Enoplida).” No. 1, 13 pp.
b. WILLIAMS, J. R., 1958.—“Studies on the nematode soil fauna of sugar cane fields in Mauritius. 2. Belondiridae (Dorylaimoidea, Enoplida).” No. 2, 9 pp.

(265a) Williams briefly describes and figures 14 species of *Mononchus* which he found in sugar-cane fields in Mauritius. There are remarks on each. *M. mauritanus* n.sp. is described and figured for the first time. It differs from its nearest relative, *M. palustris* Cobb, 1917 in having a bulbous anal region and a digitate tail. The other species mentioned are: *M. brachylaimus*, *M. brachyurus*, *M. dentatus*, *M. incurvus*, *M. index*, *M. lacustris*, *M. longicaudatus*, *M. muscorum*, *M. papillatus*, *M. rapax*, *M. sigmaturus*, *M. trichurus* and *M. sp.* near *striatus*. J.B.G.

(265b) Among the Belondiridae encountered in Mauritius, Williams describes and figures or records and figures: *Axonchium mauritiense* n.sp. (female) differing from *A. amplicolle* in the shape and size of the spear; *A. bulbosum* n.sp. (female) similar to *A. mauritiense* but smaller and with a very thick cuticle on the tail; *A. caudatum* n.sp. (juvenile) similar to *A. mauritiense* but with a rounded peg-like tail; *Oxydirus oxycephalus*; *Nygellus symmetricus* n.sp. (female) differing from *N. clavatus* in being longer and more slender, by the presence of paired gonads and a more posterior vulva; *Dorylaimellus clavicaudatus* n.sp. (female) distinguished by the clavate tail and single posterior ovary; *Belondira singularis* n.sp. (female) distinguished by the tail which begins cylindrically, then expands slightly before sharply narrowing to a finger-like last half; *B. perplexa* n.sp. (female) has spear and associated parts similar to those of *Dorylaimoides* but belondirid oesophagus, gonads and lip region. J.B.G.

266—Optima. Johannesburg.

- a. ALVES, W., 1958.—“The challenge of Bilharzia in a developing Africa.” 8 (3), 139–146.

(266a) After briefly recounting the life-cycle of *Schistosoma haematobium*, Alves goes on to review the incidence and distribution of bilharziasis in Africa, bringing together much useful information in very condensed form. He warns against the certainty that the disease will become more prevalent in many areas following upon the introduction or extension of irrigation schemes. Tanganyika is likely to become a classic example of the dangers inherent in the economic opening up of Africa by irrigation and water conservation. The Transvaal is likely to become a more dangerous province of South Africa than Natal. A very large part of Africa, and perhaps the most potentially productive part, is infected; and the disease is extending into areas (e.g. the north-eastern Belgian Congo) previously free. Control measures are reviewed and favourable mention given to the continuous feeding of one-eighth of a part per million of copper sulphate into irrigation water. Research is now overstressed. Much can be done by ordinary simple public health methods. Alves concludes by stressing that development of irrigation farming in Africa must take anti-bilharziasis measures into account from the start. J.M.W.

267—Parasitology.

- a. CROFTON, H. D., 1958.—“Nematode parasite populations in sheep on lowland farms. IV. The effects of anthelmintic treatment.” 48 (3/4), 235–242.
b. CROFTON, H. D., 1958.—“Nematode parasite populations in sheep on lowland farms. V. Further observations on the post-parturient rise and a discussion of its significance.” 48 (3/4), 243–250.

- c. CROFTON, H. D., 1958.—"Nematode parasite populations in sheep on lowland farms. VI. Sheep behaviour and nematode infections." 48 (3/4), 251-260.
- d. FOSTER, R., 1958.—"The effects of trematode metacercariae (Brachylaemidae) on the slugs *Milax sowerbii* Férussac and *Agriolimax reticulatus* Müller." 48 (3/4), 261-268.
- e. GRESSON, R. A. R., 1958.—"The gametogenesis of the digenetic trematode *Sphaerostoma brahamae* (Müller) Lühe." 48 (3/4), 293-302.
- f. FOSTER, R., 1958.—"Infestation of the slugs *Milax sowerbii* Férussac and *Agriolimax reticulatus* Müller by trematode metacercariae (Brachylaemidae)." 48 (3/4), 303-311.
- g. ERASMUS, D. A., 1958.—"Studies on the morphology, biology and development of a strigeid cercaria (*Cercaria* X Baylis 1930)." 48 (3/4), 312-335.
- h. THOMAS, J. D., 1958.—"Studies on *Crepidostomum metoecus* (Braun) and *C. farionis* (Müller), parasitic in *Salmo trutta* L. and *S. salar* L. in Britain." 48 (3/4), 336-352.
- i. JAIN, G. P., 1958.—"On *Cercaria mehrai* Faruqui, 1930 with notes on its life-history." 48 (3/4), 413-418.
- j. LEE, D. L., 1958.—"On the morphology of the male, female and fourth-stage larva (female) of *Hammerschmidtella diesingi* (Hammerschmidt), a nematode parasitic in cockroaches." 48 (3/4), 433-436.
- k. LEE, D. L., 1958.—"Digestion in *Leidynema appendiculata* (Leidy, 1850), a nematode parasitic in cockroaches." 48 (3/4), 437-447.
- l. REES, G., 1958.—"A comparison of the structure of the scolex of *Bothriocephalus scorpii* (Müller 1776) and *Clestopothrium crassiceps* (Rud. 1819) and the mode of attachment of the scolex to the intestine of the host." 48 (3/4), 468-492.

(267a) Crofton, continuing his work on populations of nematode parasites of sheep, reports observations on the effect of routine anthelmintic treatment of commercial flocks. He concludes that monthly treatment with both phenothiazine and copper and nicotine sulphate mixture effectively delay the rise in egg counts in sheep flocks. However, with infection pressure greater than that observed, due to over-stocking or any other means, the copper and nicotine sulphate mixture might provide less adequate control than phenothiazine, and an outbreak might occur. Crofton suggests that the efficacy of drugs should be considered in relation to infection pressure or rate of increase of population by thinking in terms of a composite factor—the "Delaying Time". This factor would vary for different flocks even with the same drug. If the rate of increase was low for parasites of a given flock, adequate anthelmintic treatment could be provided by lengthening the intervals between treatment. The author warns that the net result of treatment may be to produce flocks which remain susceptible in autumn and winter to infections from which they may later die. J.M.W.

(267b) Crofton presents evidence showing that a rise in egg count in ewes occurs six to eight weeks after parturition and that this rise is unrelated to season. The significance of this phenomenon is discussed and the differences in connection with spring-lambing and autumn-lambing flocks are set forth. It is pointed out that the post-parturient rise provides a nucleus of infective stages available to the young and susceptible lambs. J.M.W.

(267c) Crofton describes observations on the distribution of grazing sheep by means of aerial photographs and on the movements of flocks as evidenced by direct observation and by study of the distribution of faecal pellets. He concludes that each grazing adult sheep maintains its position by visual reference to two other sheep situated in front of it and subtending an angle of 110°. Young lambs do not show this type of orientation, but because of their close association with ewes they are incorporated into the main flock pattern. With ten or more sheep, subflocks may be formed. Faecal pellets are not distributed at random and areas of high concentration appear in different parts of the pasture. These areas are produced by reduced flock movement during the hours of darkness; and do not, therefore, necessarily correspond to the most heavily grazed areas of the past. They are avoided for five to eight days; and the regrazing of an area will therefore tend to coincide with the maximum numbers of infective trichostrongyle larvae. The significance of these findings is discussed. J.M.W.

(267d) Foster maintained colonies of wild *Milax sowerbii* and *Agriolimax reticulatus*, collected from localities known to be infested with brachylaemids, and studied the degree of infection and histological and lethal effects on both slugs, and the effect on feeding and

fecundity in *A. reticulatus*. Only the kidney was invaded by unencysted metacercariae and this led to wide-spread necrosis of the organ, the necrotic debris being ingested by the parasites. The lethal effect on *A. reticulatus* was greater and more rapid than in *M. sowerbii* which withstood the damage caused until the metacercariae reached maturity, leading to the conclusion that the latter is the natural intermediary. The ability of *M. sowerbii* to survive for some months while apparently without a functional kidney raises a number of problems. Feeding and egg-laying were depressed in infected *A. reticulatus*. The possibility of using this or similar infections in the biological control of these pests is discussed. S.W.

(267e) Gresson has found the diploid chromosome number in *Sphaerostoma bramae* to be 24. Spermatogenesis mainly follows the usual pattern of digenetic trematodes. No centrosome could be detected in the spermatozoon which is nuclear and cytoplasmic in origin. The fine structure of the tail could not be determined. The Golgi elements appear, in Kolatchev preparations, as short rods and filaments; these are eliminated from the spermatid in the residual cytoplasm. Mitochondria were visible in spermatogonia, spermatocytes and spermatids, those of the spermatid remaining in the residual cytoplasm. The mature ovary is normally completely filled with primary oocytes with nuclei either in the resting condition or in early prophase of the first meiotic division; short rod-like Golgi bodies are present and granular and rod-shaped mitochondria are concentrated in a single mass at one pole or two masses at opposite sides of the nucleus, although a few may be scattered throughout the cytoplasm. Nuclear material appears to be passed from the oocyte nucleus into the cytoplasm. S.W.

(267f) Foster has studied the ecology and distribution of *Milax sowerbii* and *Agriolimax reticulatus*, parasitized by a brachylaemid metacercaria, in Durham City. Slugs from twelve localities in County Durham and from Derbyshire, Oxfordshire and Surrey were not infected. The seasonal incidence of the parasitism followed a regular pattern from 1949 to 1953 when it was suddenly and inexplicably reduced. Infection by the metacercariae occurred in March or April and in *A. reticulatus* reached 90% to 100% by June or July when it dropped sharply owing to the high death rate amongst parasitized individuals. In *M. sowerbii* the incidence reached a peak in late summer and did not fall until the winter, thus indicating greater tolerance. Secondary infections occurred in the autumn. No hosts which harboured metacercariae also contained sporocysts and it seems likely that two intermediaries are involved. The incidence of the four developmental stages found also fluctuated. Although neither natural infections of small mammals with the adult were observed nor were experimental infections successful it appears probable that the natural definitive host is a small mammal of nocturnal habits and which hibernates during the winter. S.W.

(267g) Erasmus describes in detail the morphology and biology of sporocysts and cercariae of *Cercaria X* (Baylis, 1930). He then describes the morphology of metacercariae and diplostomulae, recovered from experimentally infected fish after periods of from 7 to 544 days after infection. The author notes that while numerous species of fish, amphibians and mammals may be infected in nature or experimentally, the metacercariae have been in all cases confined to the lens of the eye. Host-parasite relationships are discussed for sporocyst, cercaria and diplostomula. Attempts to complete the life-cycle in birds or rats were unsuccessful. Histochemical tests indicated the presence of alkaline phosphatase in the cuticle. The distribution of glycogen in the cercaria was also studied. P.K.

(267h) Thomas examined a total of 1,312 *Salmo trutta* from four habitats in mid-Wales, 274 *S. salar* from one and 243 *Anguilla anguilla* from two. The percentage of *S. trutta* infected with *Crepidostomum* spp. varied from 60.2% at one station to 81.0% at another; 33.9% of *S. salar* were infected and 0.65% of *A. anguilla* which is believed to be an accidental host. The two species are identified as *C. metoecus* and *C. farionis*, the former being recorded for the first time from Britain. Their morphology is described, that of *C. metoecus* in more detail, and compared and the taxonomy discussed; there was evidence of habitat isolation, *C. metoecus*

occurring predominantly in the pyloric caeca and *C. farionis* further back in the intestine. There was no evidence of pathogenicity or of age resistance or acquired immunity. Large numbers of the flukes were frequently present, the maximum number recovered from one fish being 157. Infection reached a peak with both species during the winter and was lowest during the summer and this is correlated with a periodicity in the swarming of cercariae. S.W.

(267i) Jain describes the characteristic movements of *Cercaria mehrai* Faruqi, 1930 from *Indoplanorbis exustus*. He then gives a detailed account of the mother and daughter rediae, of the cercaria itself, and of the metacercaria. Adults were obtained by feeding the encysted metacercariae to trematode-free white rats; and were identified as *Paryphostomum mehrai*. *C. mehrai* and *C. palustris* Chatterji, 1933 are indistinguishable. They are both characterized by 43 collar spines arranged in two rows uninterrupted dorsally, as is also the adult worm, *P. mehrai*. Both cercariae belong to the *Echinata* group of Sewell (1922). P.K.

(267j) Lee describes the male, female and the female fourth-stage larva of *Hammer-schmidtella diesingi* (Hammerschmidt, 1838) from a study of specimens obtained from the hind-gut of *Blatta orientalis* and of *Periplaneta americana*. The presence of a constriction and a ring of cells separating the intestine of the male and of the fourth-stage female larva into two parts is reported and its structure and function are described in detail. Characters are given by which this species can be identified from the female fourth-stage larva. W.G.I.

(267k) Lee, after describing the experimental methods employed, reports the following digestive enzymes from the nematode *Leidynema appendiculata*, a parasite of the cockroach: an amylase, with optimum activity at pH 4.5; a maltase, optimum activity at pH 5 to 6, which is inhibited by 15% glycerin; a protease, maximum activity at pH 6, the activity of which is not increased by KCN; a peptidase splitting glycyl-glycine, DL-leucyl-glycine and DL-leucyl-glycyl-glycine; a prolidase splitting glycyl-L-proline; and a lipase, maximum activity at pH 7, hydrolysing glycerol tributyrate, but not olive oil and ethyl butyrate. No lactase or invertase was detected and no positive results were obtained on testing for esterase but this may have been due to the method employed. The author concludes that the enzymes are distinct from those of the host and that digestion in the nematode probably takes place over the range pH 5.5 to 6. W.G.I.

(267l) Rees has made a detailed, comparative study of the musculature and nervous and excretory systems of the scoleces of *Bothriocephalus scorpii* and *Clestobothrium crassiceps*. The musculature of the scolex is derived, in the main, from the muscles of the strobila; the arrangement immediately behind the scolex was studied and the muscles followed forwards. All major groups are present in both species and in *B. scorpii* there is little modification. In *C. crassiceps* the presence of hemispherical bothria instead of open grooves and of a sphincter around the bothrial opening has caused some modification. Both nervous and excretory systems show a fundamental similarity but modifications in *C. crassiceps* can be correlated with the shortening of the scolex and difference in the form of the bothria. The mode of attachment of both species is discussed; no specimens of *C. crassiceps* were fixed *in situ* but in *B. scorpii* the structure of the scolex has been shown to be admirably suited to the form of the host's mucosa. The paper is illustrated by numerous line drawings and photomicrographs. S.W.

268—Phytopathology.

- a. PARTYKA, R. E. & MAI, W. F., 1958.—“Nematocides in relation to sclerotial germination in *Sclerotinia sclerotiorum*.” 48 (9), 519–520.
- b. CHAPMAN, R. A., 1958.—“The effect of root-lesion nematodes on the growth of red clover and alfalfa under greenhouse conditions.” 48 (10), 525–530.
- c. GOOD, J. M., BOYLE, L. W. & HAMMONS, R. O., 1958.—“Studies of *Pratylenchus brachyurus* on peanuts.” 48 (10), 530–535.
- d. ENDO, B. Y. & SASSER, J. N., 1958.—“Soil fumigation experiments for the control of the soybean cyst nematode, *Heterodera glycines*.” 48 (10), 571–574.

- e. ROSS, J. P., 1958.—“Host-parasite relationship of the soybean cyst nematode in resistant soybean roots.” 48 (10), 578-579.
- f. HEWITT, W. B., RASKI, D. J. & GOHEEN, A. C., 1958.—“Nematode vector of soil-borne fanleaf virus of grapevines.” 48 (11), 586-595.
- g. TODD, E. H. & ATKINS, J. G., 1958.—“White tip disease of rice. I. Symptoms, laboratory culture of nematodes, and pathogenicity tests.” 48 (11), 632-637.
- h. HOLLIS, J. P., 1958.—“Relations between root knot and *Fusarium* vascular discoloration in cotton varieties.” 48 (12), 661-665.
- i. DROLSOM, P. N., MOORE, E. L. & GRAHAM, T. W., 1958.—“Inheritance of resistance to root-knot nematodes in tobacco.” 48 (12), 686-689.

(268a) In green-house tests, D-D treatment of soil artificially infested with sclerotia of *Sclerotinia sclerotiorum*, the organism causing “drop” of lettuce, led to an increase in stipe formation, the major factor in spread of field infection, and a decrease in formation of vegetative hyphae, these phenomena being accentuated by increased D-D dosage. Other tests indicated that the dichloropropene content of the fumigant was responsible and the authors suggest that this may explain the increased incidence of the disease frequently observed after continued use of fumigants containing dichloropropene. In an unreplicated test with other nematicides, Nemagon, Telone (1,3-dichloropropene and related chlorinated hydrocarbons) and Doralone (mixed dichloropropenes and 1,2-dibromoethane) increased stipe formation, while W-40 (1,2-dibromoethane) did not.

R.D.W.

(268b) Chapman grew red clover (var. Kenland) and lucerne (var. Atlantic) in half-gallon glazed crocks of steam-sterilized soil inoculated with a *Pratylenchus* population (mainly *P. penetrans* and *P. coffeae*, with some *P. minyus*) at four levels—0, 500, 1,180 and 2,700 nematodes per crock. The growth of the plants over a period of almost a year was followed, 13 cuttings being taken at intervals, beginning after 105 days. Significant or highly significant reductions in growth of both types of plant were caused by the nematodes, these reductions being greatest in summer. In lucerne, periods of recovery alternated with periods of significant reduction. The nematodes multiplied readily in the roots of both hosts.

R.D.W.

(268c) From field observations and several pot and field experiments, Good *et al.* found *Pratylenchus brachyurus* to be a serious pest of peanuts. The nematodes occurred in the roots, pegs (pod stalks) and mature shells, but were most numerous in the shells where they formed dark coloured lesions. These shells remained a potential source of inoculum even after being cured and stored over winter. Apart from causing stunting, chlorosis and general debility of the plants, the nematodes were associated with a peg rot similar to that attributed to *Sclerotium rolfsii*. Good control was obtained by soil treatment with D-D, Telone and Nemagon.

R.D.W.

(268d) Endo & Sasser successfully reduced the numbers of *Heterodera glycines* cysts in the soil and the numbers of females on the roots of soya beans, whilst increasing nodulation, growth and yield. The following replicated pre-plant treatments were used: D-D at 40 and 60 U.S. gal. per acre, Telone at 40 U.S. gal. per acre, Nemagon at 5 U.S. gal. per acre and methyl bromide gas at 1 and 2 lb. per 100 sq. ft. The improved plant growth following treatment also permitted the increase in the numbers of nematodes surviving fumigation. Methyl bromide at 3 lb. per 100 sq. ft. proved phytotoxic and Dowfume W-85 was ineffective in reducing infestation. Rotation combined with fumigation is suggested as the best control measure available.

J.E.P.

(268e) From cytological studies of the host-parasite interactions of *Heterodera glycines* in the roots of resistant (var. Peking) and susceptible soya beans, Ross found that sharp differences in plant reaction were found only after the larvae had become sedentary. In roots of resistant plants no giant cells were formed; instead, the cells adjacent to the head end of the nematode appeared disorganized and necrotic. No fourth-stage or adult females were found (although occasionally adult females were found on the roots of this variety in the field), and some third-stage larvae appeared to be degenerating. Fourth-stage and adult

males were common. In all cases the cells in the feeding areas of the nematodes were necrotic. Ross regards the reaction of this resistant variety to *H. glycines* as a type of hypersensitivity.

R.D.W.

(268f) Experiments in vineyards and in containers under controlled conditions showed that fan-leaf disease of grape-vines is soil-borne and not air-borne. Handpicked washed specimens of the nematode *Xiphinema index* Thorne & Allen transmitted the virus from soil containing plants with fan-leaf disease to healthy plants growing in pots. Furthermore, *X. index* from the roots of healthy Tokay grapes and from the root zone of figs transmitted fan-leaf from fan-leaf diseased grape-vines to healthy grape-vines growing in the same pot. In the absence of this nematode, fan-leaf was not transmitted from diseased to healthy grape-vines growing in the same pot. This is the first report showing that nematodes are vectors of one of the soil-borne viruses.

H.R.W.

(268g) Todd & Atkins describe the symptoms of white tip disease of rice caused by *Aphelenchoides besseyi*. They found the nematodes on the inner surface of the hulls and on the kernels of rice seed, around the young undeveloped leaves and flowers and in washings from leaf sheaths but nowhere within the tissues. Nematodes remained viable on dry seed up to 23 months old. The nematodes were cultured on autoclaved rice seed in the presence of several fungi but failed to multiply in the absence of fungi. White tip disease was eliminated when infested seed was treated for 15 minutes in water at 54°C. The disease could be induced in rice seedlings if infested grains were mixed with the soil or if a suspension of the nematodes was placed under the leaf sheath. Successful inoculation was also carried out on small field plots by a method which could be used for variety testing.

M.T.F.

(268h) The four cotton varieties DPL 15, Coker 100 Wilt, Plains and Auburn 56 were grown on seven field sites in four regions of Louisiana having moderate to severe root-knot-wilt infestations. The root-knot nematodes *Meloidogyne incognita* and *M. incognita* var. *acrita* are here considered as one highly variable species, or species complex, referred to as *M. incognita*. The plants were graded for degree of root-knot infestation at harvest or four to six weeks before harvest, and at the same time the degree of vascular discoloration was assessed as a measure of the infection by the wilt fungus *Fusarium oxysporum* f. *vasinfectum*. Although the degree of infestation with both pathogens varied greatly between sites they both affected the cotton varieties in the same descending order of severity, viz., DPL 15 most severely, Coker 100 Wilt less so, and Plains and Auburn 56 equally but least severely. It is considered that practical recommendations from results in one region should be applicable to other cotton-growing regions.

M.T.F.

(268i) Continuing their studies on the inheritance of resistance to root-knot nematodes in *Nicotiana tabacum* the authors grew seedlings of F_1 , F_2 and F_3 generations and back-crosses to resistant or susceptible parents in green-house and field soil infested with *Meloidogyne incognita* var. *acrita*. The results supported the hypothesis that a single dominant factor, or a block behaving as a single factor, governs the inheritance of resistance to the populations involved. Modifying genes augmenting resistance were apparently present in some parents, while in some progeny groups, where excess susceptible plants occurred, these factors appeared to be absent. Resistant plants were also resistant to *M. incognita*.

M.T.F.

269—Plant Disease Reporter.

- a. GOLDEN, A. M., 1958.—“Interrelationships of certain *Beta* species and *Heterodera schachtii*, the sugar-beet nematode.” 42 (10), 1157–1162.
- b. GOLDEN, A. M. & SHAFER, T., 1958.—“Unusual response of *Hesperis matronalis* L. to root-knot nematodes (*Meloidogyne* spp.).” 42 (10), 1163–1166.
- c. MCGLOHON, N. E. & BAXTER, L. W., 1958.—“The reaction of *Trifolium* species to the southern root-knot nematode, *Meloidogyne incognita* var. *acrita*.” 42 (10), 1167–1168.
- d. MCGUIRE, D. C. & ALLARD, R. W., 1958.—“Testing nematode resistance in the field.” 42 (10), 1169–1172.

- e. GOOD, J. M. & STEELE, A. E., 1958.—“Soil fumigation for controlling root-knot nematodes on tomatoes for transplant and for fresh fruit production.” 42 (10), 1173-1177.
- f. MILLER, P. M., 1958.—“Fumigation when transplanting nursery stock.” 42 (10), 1178.
- g. LOOS, C. A., 1958.—“Certain fatty acids and hexadecylamine as nematocides.” 42 (10), 1179-1186.
- h. LOOS, C. A. & STESEL, G. J., 1958.—“A comparison of two contact nematocide test methods.” 42 (10), 1187-1191.
- i. FERRIS, V. R. & FERRIS, J. M., 1958.—“A simple method for making rapid routine photographs of nematodes.” 42 (10), 1192-1193.
- j. MILLER, P. M., 1958.—“How growers can determine their own nematode problems.” 42 (10), 1194.
- k. STEELE, A. E. & GOOD, J. M., 1958.—“Evaluation of several nematocides for control of sting nematodes on lima beans.” 42 (11), 1284-1287.
- l. REYNOLDS, H. W. & O'BANNON, J. H., 1958.—“The citrus nematode and its control on living citrus in Arizona.” 42 (11), 1288-1292.
- m. LUCAS, G. B., 1958.—“Tobacco diseases in Panama.” 42 (11), 1301.
- n. SCHINDLER, A. F., 1958.—“Attempts to demonstrate the transmission of plant viruses by plant parasitic nematodes.” 42 (12), 1348-1350.
- o. CHAPMAN, R. A., 1958.—“An evaluation of methods for determining the number of nematodes in soil.” 42 (12), 1351-1356.
- p. JENSEN, H. J., SMITHSON, H. R. & LORING, L. B., 1958.—“Potato-rot nematode, *Ditylenchus destructor* Thorne 1945, found in dahlia roots.” 42 (12), 1357-1359.
- q. LEWIS, G. D. & MAI, W. F., 1958.—“Chemical control of *Ditylenchus dipsaci* (Kühn) Filipjev in organic soils of southern New York.” 42 (12), 1360-1363.
- r. GOOD, J. M. & STEELE, A. E., 1958.—“Control of sting nematodes for two growing seasons by soil fumigation.” 42 (12), 1364-1367.

(269a) In laboratory tests, root diffusates of the resistant plants *Beta patellaris*, *B. procumbens* and *B. webbiana* were just as effective as that of sugar-beet in stimulating hatching of *Heterodera schachtii*. In green-house tests large numbers of larvae entered the roots of all four plants but developed readily only in sugar-beet on which alone mature females developed. A very few males reached maturity on the resistant plants, the lowest numbers being on *B. procumbens*. Results of pathogenicity tests suggest that growth of the resistant plants was not adversely affected by an eelworm inoculum which reduced growth of sugar-beet by 7.5%.
R.D.W.

(269b) *Hesperis matronalis* and tomato seedlings grown in the green-house were inoculated with *Meloidogyne arenaria*, *M. arenaria* subsp. *thamesi*, *M. hapla*, *M. incognita*, *M. incognita* var. *acrita* and *M. javanica*. All plants became galled but galling was less marked on *Hesperis* although similar numbers of larvae entered the roots of the two species. After 15 days very few larvae had developed beyond the infective stage in *Hesperis*, but in tomato some larvae had developed to the third and fourth stages. In *Hesperis* plants grown for four months no mature females were found and the galls contained no larvae. No males were found in the surrounding soil. Galling of the roots therefore does not necessarily prove a plant to be a host of root-knot nematodes. It is pointed out that *Hesperis matronalis* would act as a trap plant for root-knot nematodes as well as for the sugar-beet nematode (*Heterodera schachtii*).
M.T.F.

(269c) One hundred breeding clones of *Trifolium repens* L. were susceptible to *Meloidogyne javanica*, *M. arenaria*, *M. hapla*, *M. incognita* and *M. incognita* var. *acrita*, although some differences in susceptibility were noticed. Seedlings of 24 other species of *Trifolium* inoculated with *M. incognita* var. *acrita* all became severely galled. Partial resistance to root-knot disease was observed in certain individual plants of *T. repens*. It is therefore concluded that the best means of developing a variety of white clover resistant to root-knot disease will be by selection of the more resistant clones rather than by hybridization.
M.T.F.

(269d) McGuire & Allard carried out three large scale field trials with lima beans on the island of Oahu, Hawaii for resistance to the root-knot nematode, *Meloidogyne incognita acrita*. In the first trial tests were made on five commercial varieties, ten strains that had previously shown root-knot resistance in California, and 135 F₃ families derived from resistant strains crossed with susceptible commercial varieties. Of 66 entries in the second trial most

of them were F_4 progenies from the first trial. The third trial included 106 entries of which 45 were F_3 families previously tested in California. Nine of these 45 F_3 families were found to be homozygous for susceptibility in Hawaii. Of the commercial varieties tested only Westan showed moderate resistance. Nine out of the ten strains in the first trial showed good resistance, L 136 having roots completely free of galls. D.J.H.

(269e) Two weeks before sowing them with tomato seeds, field plots were treated with (i) 83% EDB (ethylene dibromide) at 4.4 and 5.9 gal. per acre, (ii) D-D mixture (50% by weight of 1:3 dichloropropane and 50% by weight of 1,2-dichloropropene) at 15 and 20 gal. per acre, or (iii) 10% by weight of DBCP (97% by weight of 1,2-dibromo-3-chloropropane on clay granules) at 346 and 692 lb. per acre. The effect of these nematicides was assessed seven weeks after planting by estimating the plant stand, plant growth, percentage of plants free of root-knot and root-knot index at each treatment, and by measuring yields and root-knot index of mature plants. The higher rates of D-D and EDB gave better root-knot control and larger yields than lower rates. The lower rate of DBCP gave similar control to the higher rates of D-D and EDB; phytotoxic effects were only found at the high rate of DBCP. J.J.H.

(269f) This paper lists names of trees around the roots of which Nemagon can safely be applied at transplanting time. J.J.H.

(269g) Fatty acids are effective nematicides at concentrations of 25 to 1,000 p.p.m., but lose their activity in contact with soil. Fatty acids may be of value as surface disinfectants of machinery, containers and soil surfaces or in combination with soil fumigants. The use of these chemicals as nematicides is expensive and so it is considered that their large scale use is impracticable. H.R.W.

(269h) Two contact test methods for screening chemicals for nematocidal activity, using *Panagrellus redivivus* as the test organism, were studied. In the first method the nematodes were placed in a dish containing the chemical and inactivation was assessed by probing the nematodes after 24 hours. In the second test method the liquids were continually agitated and aerated and counts of inactive nematodes were made without probing. All stages were examined by this second technique and more individuals were counted, these being the primary advantages over the first test method. Similar results were obtained with both methods and there is no difference in the amount of time taken. H.R.W.

(269i) For routine photomicrography of fixed or relaxed nematodes, the authors make negative prints direct from the microscope. The room is darkened and photographic enlarging paper is held by a ring stand above the microscope previously focussed in the appropriate plane. The microscope lamp is switched on for a few seconds and the paper is then developed and fixed in the usual way. The authors, working together, can produce 15 to 20 photographs of different nematodes in a period of three hours. C.C.D.

(269j) The method consists of taking a series of soil samples from each field to be examined, thoroughly mixing the samples together, dividing the bulk sample into two parts and treating one part with Nemagon. Test plants are grown in both treated and untreated parts and if, after a suitable period, growth in the treated soil appears more vigorous than that in the untreated, the author claims that there is an indication that a nematode problem exists. C.C.D.

(269k) Reductions in numbers of *Belonolaimus gracilis*, obtained by Steele & Good, in replicated randomized plots treated with brominated hydrocarbons (EDB and DBCP) or with EDB-DCP mixture, were maintained for at least 126 days after treatment. Nematicides such as D-D and DCP which do not contain brominated hydrocarbons, though having an initial reducing effect, did not prevent a subsequent increase in numbers. Such differences in control may be due to the lower vapour pressure, and, therefore, greater persistence in the soil, of the brominated compounds. Increases in yield of lima beans, planted two weeks after

treatment, were higher from plots treated with 41% EDB or with DCP-EDB mixture than from plots treated with the non-brominated nematicides. The excellent control of nematodes by DBCP was offset by the phytotoxic effect of this chemical causing reduction in bean yield. J.E.P.

(269l) 1,2 dibromo-3-chloropropane (DBCP) containing 8.6 pounds of active ingredient per gallon of emulsifiable concentrate was applied at rates selected from 10, 5, 6, 4, 3 and 2 gal. per acre to the soil on three sites infested with the citrus nematode *Tylenchulus semi-penetrans*. Some of the citrus trees were pruned in conjunction with the soil treatment. All rates of DBCP application resulted in excellent control of the nematode, the pruning speeded the trees' recovery. The two methods of application of the nematicide are described. J.J.H.

(269m) Root-knot (caused by *Meloidogyne incognita*) and brown root rot (*Pratylenchus* sp.) were the nematode diseases of tobacco found by Lucas in Panama. *Helicotylenchus* sp. and *Trichodorus* sp. were found in the tobacco fields. J.J.H.

(269n) Under the conditions of Schindler's experiments, the presence of *Meloidogyne* spp. did not increase the incidence of either tobacco or cucumber mosaic in tobacco or tomato, nor did a mixed population of *Helicotylenchus nanmus* and *Paratylenchus* spp. increase the incidence of carnation mottle virus in carnation. R.D.W.

(269o) Chapman gives comparative data for three methods of recovering nematodes from soil: (i) a Baermann funnel method, (ii) a method involving "roiling", sieving and Baermann funnel and (iii) Seinhorst's two-Erlenmeyer flask method. He concludes that method (iii) results in more complete and less variable extractions than the other two and is quite adequate for many quantitative purposes. R.D.W.

(269p) Jensen *et al.* record the finding of *Ditylenchus destructor* in dahlia tubers from Oregon. No typical symptoms could be associated with an attack by this nematode but tubers and roots showing longitudinal cracking, sloughing and cortex flaking should be regarded with suspicion. Photographs of sections of infected tubers are given and the more advanced stages of infection resemble an attack by *D. destructor* on potatoes. The infected tissues are brown to black in colour and the breakdown is of a dry granular type. Infections have been observed in seven named dahlia varieties. Hot-water treatment studies to control the pest are in progress. D.J.H.

(269q) Lewis & Mai were able effectively to control the onion root eelworm, *Ditylenchus dipsaci*, in organic soils and increase onion yields by using D-D at rates of up to 110 U.S. gal. per acre, as a pre-plant treatment. J.E.P.

(269r) Good & Steele found that DBCP applied in rows at 0.9 U.S. gal. per acre, four weeks before sowing, controlled *Belonolaimus* sp. and increased yields of cotton and maize for two growing seasons. EDB and dichloropropene-type nematicides only achieved an initial control, the former being more effective than D-D or DCP. J.E.P.

270—Plant Disease Reporter. Supplement.

- a. KOCH, L. W. ET AL., 1958.—"Rootrot and related literature. An annotated bibliography 1957." Suppl. 252, pp. 83-158.

271—Plant Pathology. London.

- a. FRENCH, N., 1958.—"*Aphelenchoides ritzema-bosi* on phlox." 7 (1), 38.
- b. THOMAS, P. R., WIGGELL, P. & MOYSE, W. J., 1958.—"Observations on eelworm control in narcissus in the Isles of Scilly." 7 (2), 49-50.

(271a) French reports that plants of *Phlox paniculata* L., from Cumberland, showing typical symptoms of infection by *Ditylenchus dipsaci* were found on examination to contain both *D. dipsaci* and *Aphelenchoides ritzema-bosi*. The latter were absent from the leaves but found with *D. dipsaci* in the pith. The origin of the infestation was not determined. This is the first record of *A. ritzema-bosi* occurring on *P. paniculata*. D.J.H.

(271b) Thomas *et al.* attempted to eradicate *Ditylenchus dipsaci* from infested narcissus plots by the use of soil fumigants. Two heavily infested plots from which bulbs had been lifted in June, 1955 were treated with either D-D or EDB, the EDB being mixed with an equal volume of paraffin, during the second ploughing in August. Application was by watering can at 100 or 200 gal. per acre. Surface seals of 1% preparations of either solubilized xylenol or cresylic acid were applied at 2 gal. per sq. yd. The soil temperature was 76°F. six inches below the soil surface. Bulbs planted in the treated plots showed no eelworm-infected plants during the first year of flowering although bulbs were attacked in adjacent beds. However, during the second year, re-infestation, which is thought to have come from the adjacent beds, occurred on the treated plots. Eelworm patches occurring in established narcissus beds can be controlled by injecting bulbs with D-D over a slightly wider area than the visibly infested patch and destroying infected foliage by thoroughly wetting with a solution of 10 to 15 parts of cresylic acid in water. D.J.H.

272—Poultry Science.

- a. REID, W. M., 1958.—“Incidence of helminth and external parasites in Georgia broilers.” 37 (3), 586–592.
- b. PLATT, C. S. & SCHWABE, O., 1958.—“A notation on the egg production and mortality of pullets free of capillary worms.” 37 (3), 727.

(272a) Between October 1955 and January 1957, Reid examined 1,000 broilers representing a random sample of 440,974 birds from 100 North Georgia flocks and found the incidence of parasites to be as follows: Nematoda, *Ascaridia galli* 27.5% in birds and 59% in flocks, *Heterakis gallinae* 6.8% and 24%; Cestoda, *Raillietina cesticillus* 0.2% and 1.0%, *R. echinobothrida* 0.1% and 1.0%, *R. tetragona* 0.1% and 1.0%, and *Hymenolepis carioca* 0.1% and 1.0%. Current broiler management practices are discussed in relation to parasitism. They are found to assist in the completion of the life-cycle of *A. galli*, which has a high incidence in flocks, but to reduce or eliminate development of other species of parasites which are commonly found in poultry in the same area. Under the conditions studied the use of nicotine sulphate or piperazine salts as an anthelmintic gave erratic results and Reid considers them to be of doubtful economic value. I.C.W.

(272b) Platt & Schwabe suggest that the presence of capillary worms [identity unspecified] in pullets, as determined by examination of the faeces for eggs, in New Brunswick, New Jersey, U.S.A., may have had an adverse effect upon both egg production and mortality of the pullets. Their evidence is based upon observations made on 29 pens of 16 pullets each during the period from 1st October 1956 to 15th September 1957. I.C.W.

273—Proceedings of the Australian Society of Animal Production.

- a. GORDON, H. McL., 1958.—“The effect of worm parasites on the productivity of sheep.” 2, 59–68.

(273a) Gordon presents results of laboratory and field trials, carried out by himself and by other workers, to emphasize the ways in which helminths may harm their sheep hosts and affect their productivity. Severe haemonchiasis and trichostrongylosis may be accompanied by heavy mortality. Less severe infections with *Trichostrongylus colubriformis* and *Haemonchus contortus*, and infections with *Oesophagostomum columbianum* result in loss of appetite, reduced weight gains, and impairment in the quality and quantity of wool produced. *Chabertia ovina* infection also affects wool production. *H. contortus* infection causes reduction in milk yield of ewes. False impressions regarding the effects of helminthiasis and its control may be produced by the occurrence of infections with worms which produce no eggs and are therefore not detected by faecal examination, and by the occurrence of spontaneous recovery. In trials with grazing sheep it is necessary to control or to make allowance for the effect of helminthiasis. Further helminthological work is needed on changes in epidemiology due to changes in husbandry; on the effects of immature worms; on thriftiness and milk production; and on infections in fat lambs. Five tables and six graphs illustrate the paper. J.M.W.

274—Proceedings of the Louisiana Academy of Science.

- a. BENNETT, H. J., 1958.—“The genus *Ophiotaenia* as representative of the cestodes for introductory zoology.” Year 1957, **20**, 7-9.
- b. BENNETT, H. J. & ALLISON, R., 1958.—“Observations on the life cycle of the trematode, *Stichorchis subtriquetrus*.” Year 1957, **20**, 10-13.
- c. JOHNSTON, T., 1958.—“The effect of soil moisture on *Tylenchorhynchus martini* and other nematodes.” Year 1957, **20**, 52-55.
- d. MILLER, G. C. & EDNEY, J. M., 1958.—“The infectivity of *Schistosomatum douthitti* (Cort) cercariae of known age.” Year 1957, **20**, 55-60.
- e. SPARKS, A. K., 1958.—“Some digenetic trematodes of fishes of Grand Isle, Louisiana.” Year 1957, **20**, 71-82.

(274a) Bennett recommends the use of species of *Ophiotaenia* for routine study of cestode morphology in the elementary laboratory. They are easily collected, fixed and stained and the proglottides are small and thin enough for the main characteristics to be readily visible. S.W.

(274b) Bennett & Allison found the incubation period of the eggs of *Stichorchis subtriquetrus* to be 20 to 27 days at 25°C. to 30°C. *Fossaria parva* was used as the experimental intermediate host but no snails exposed to five or more miracidia lived to shed cercariae. Each miracidium gave rise to a single redia immediately after it had penetrated the host; daughter rediae were first found 22 days after infection of the snails and the first cercariae were shed 51 days after exposure. S.W.

(274c) The effect of soil moisture on the survival of *Tylenchorhynchus martini* and other nematodes was determined by adding water to soil in jars to give moisture contents equivalent to 11, 25, 50, 75 and 100% field capacity and saturation, and then counting the surviving nematodes after various periods of time. The optimal moisture level for *T. martini* was 40% to 60% field capacity, whilst for the remaining nematodes it was 75% to 100% field capacity. H.R.W.

(274d) Miller & Edney conducted 24 experiments with cercariae of *Schistosomatum douthitti*, one to twenty-four hours old, to determine the effect of age on infectivity. One-hour-old cercariae did not produce 100% infection, indicating that a period of activity is necessary before the cercariae are capable of penetrating their host. Cercariae two to eleven hours old caused 100% infection at temperatures of 23°C. to 26°C. After this the ability of the cercariae to penetrate declined. When the temperature was raised above 25°C. the viability of the cercariae decreased rapidly. In one experiment with 24-hour-old cercariae one male schistosome had five females in its gynaecophoric canal and in one experiment with 11-hour-old cercariae one male was observed clasping another male. Cercariae kept at 20°C. produced 100% infection when 28 hours old. S.W.

(274e) Sparks gives an annotated list of the 44 species of digenetic trematodes collected from marine fish at Grand Isle, Louisiana. Six species, which are apparently new to science, are to be described elsewhere. New host records are: *Micropogon undulatus* for *Bucephaloides caecorum* and *Fimbriatus fimbriatus*; *Euthymnus alleteratus* for *Rhipidocotyle capitatum*; *Lutjanus aya* for *Metadena globosa* and *Lepocreadium trulla*; *Pogonias cromis* for *Homalometron pallidum*; *Caranx hippos* for *Stephanostomum megacephalum*; *Brevoortia patronus* for *Parahemiurus merus*; *Bairdiella chrysura* for *P. merus* and *Lecithochirium parvum*; *Membras vagrans* for *Aponurus laguncula*. *Homalometron pallidum*, *Pleorchis americanus*, *Diplomonorchis leiostomi* and *Bathycotyle coryphaenae* are recorded from the Gulf of Mexico for the first time. S.W.

275—Proceedings of the South Dakota Academy of Science.

- a. HUGHGINS, E. J., 1958.—“Guinea worms from carnivores in South Dakota and Minnesota, with a review of the distribution and taxonomy of dracunculid worms in North America.” **37**, 40-46.

(275a) Huggins reviews the reports of *Dracunculus* spp. in North America with particular reference to their occurrence in carnivores. A list of all previous records of guinea-worms in North American carnivores is given, together with a new record of *D. insignis* from a raccoon

(*Procyon lotor lotor*) in South Dakota and from mink (*Mustela vison letifera*) in Minnesota. The taxonomy of the guinea-worms is reviewed and the author questions the validity of the conclusions reached by Mirza (1957) without specifically reaching any of his own. The life-history of dracunculids is uncritically reviewed.

W.G.I.

276—Proceedings of the Zoological Society of London.

- a. THOMAS, J. D., 1958.—“Studies on the structure, life history and ecology of the trematode *Phyllodistomum simile* Nybelin, 1926 (Gorgoderidae: Gorgoderinae) from the urinary bladder of brown trout, *Salmo trutta* L.” **130** (3), 397-435.
- b. INGLIS, W. G., 1958.—“The comparative anatomy of the subulurid head (Nematoda): with a consideration of its systematic importance.” **130** (4), 577-604.

(276a) *Phyllodistomum simile* was found in large numbers in the urinary bladder of *Salmo trutta* from the River Teify, but was absent from two other rivers in West Wales and from *S. salar* and *Anguilla anguilla*. Trout aged four years and over were more heavily infected than young fish; there was no evidence of a seasonal variation in infection. Of the local molluscan fauna examined only *Sphaerium corneum* harboured cercariae while attempted infection of possible second intermediaries from the same habitat, i.e. *Phoxinus phoxinus* and various adult and larval insects, proved unsuccessful. Thomas does not, however, reject the possible existence of a second intermediate host. Cercariae were found to encyst precociously in daughter sporocysts within the snail and when these were fed to trout, mature *P. simile* were recovered 56 days later. Thomas describes the morphology of the adults (which differed in their measurements from previously described *P. simile* and from *P. megalorchis*) and the larval stages, and discusses gorgoderid cercariae and the impossibility of their classification into groups corresponding to those of the adults.

G.I.P.

(276b) Inglis reports on the comparative anatomy of the head in the Subuluridae (Nematoda) and demonstrates three lines of morphological modification which are treated as subfamilies. It is shown that the shape of the mouth opening, the cross sectional shape of the buccal cavity and the structure of the pharyngeal portions are of systematic value. All three lines are considered to lead from a simple, unlobed hexagonal mouth opening to complex, lobed forms, showing a high degree of parallelism. The so-called “double” buccal cavity is shown to be due to the anterior end of the oesophagus becoming wholly cuticular and forming the “posterior part” of the “double” cavity. The three subfamilies are Subulurinae, mouth hexagonal, buccal cavity circular in cross section, pharyngeal portions lobed helically; Allodapinae n.subf., mouth hexagonal, buccal cavity circular, pharyngeal portions not lobed and helical; and Parasubulurinae, mouth hexagonal to triangular, buccal cavity hexagonal to triangular, pharyngeal portions lobed helically. The first subfamily has three genera: *Subulura*, *Oxyinema* and *Labiobulura*. The second has two, *Allodapa* and *Aulonocephalus*. The third has four of which two are new: *Parasubulura*; *Primasubulura* n.g., with type species *Subulura distans* (Rudolphi, 1809) and *S. loveridgei*, *S. malayensis*, *S. neodistans*, *S. otolicni*, *S. prosimiae*, *S. jacchi*, *S. cynomolgi*; *Tarsubulura* n.g. with type species *S. perarmata* (Ratzel, 1868) of which *Filaria sarasinorum* Meyer, 1896 is considered a synonym; and *Leipoanema* which is doubtfully referred to the subfamily. As far as possible species have been referred to the genera but thirty species are considered *incertae sedis*.

W.G.I.

277—Publications of the Seto Marine Biological Laboratory.

- a. YAMAGUTI, S., 1958.—“Studies on the helminth fauna of Japan. Part 53. Trematodes of fishes, XII.” **7** (1), 53-88.

(277a) Yamaguti describes and figures 21 monogenetic trematodes of which 15 are new. *Benedeniella congeri* n.g., n.sp. is based on one mature specimen from the gills of *Conger myriaster*; it is distinguished from other genera of the Benedeniinae by the cirrus pouch which contains the seminal vesicle and the prostatic duct, the whole being enclosed in the genital atrium. *Metabenedeniella hoplognathi* n.g., n.sp. was found on the gills of *Hoplognathus fasciata* and *Epinephelus septemfasciatus*; 24 specimens were recovered; *Metabenedeniella* is

differentiated from *Benedeniella* by the great length of the cirrus pouch which extends into the space between the ovary and the right testis, by the cirrus which is very long and eversible and the prostatic bulb lying outside the cirrus pouch and by various other morphological characters. 20 mature specimens of *Pseudomicrobothrium spari* n.g., n.sp. were collected from the gills of *Sparus macrocephalus*; it resembles *Microbothrium* but possesses two open bothria-like anterior pseudo-suckers, and simple caecal branches; it lacks a cirrus pouch. *Microncotrema lateolabracis* n.g., n.sp. from the gills of *Lateolabrax japonicus*, is based on 16 mature whole mounts, most of which were macerated; the outstanding character of this genus is the possession of haptor anchors which are smaller than the marginal spines; *Pseudorhabdosynchus epinepheli* n.g., n.sp., of which two mature specimens were recovered from the gills of *Epinephelus akaara*, is differentiated from *Rhabdosynchus* by the position of the adhesive plaques which are dorsal and ventral, the presence of a vagina and the lack of an accessory piece in the cirrus. *Geneticoenteron lateolabracis* n.g., n.sp., from the gills of *Lateolabrax japonicus*, has the two pairs of haptor anchors supported by one median and two sub-median transverse bars and possesses a genito-intestinal duct instead of a vagina. *Murraytrematoides ditrematis* n.g., n.sp., from the gills of *Ditrema temmincki*, resembles *Murraytrema* but differs from it in the following characters: the vas deferens loops around the left caecum, the prostatic reservoir opens into the ejaculatory duct, the ovary loops around the right caecum, the vagina opens ventrally in the left sub-median line on a level with the anterior end of the ovary, the unpaired median haptor bar articulates with the paired bars at its lateral arms and each marginal haptor hooklet has a single claw. *M. pricei* is transferred to *Murraytrematoides* as a new combination. *Pseudomurraytrema spari* n.g., n.sp. is based on four mature specimens from the gills of *Sparus macrocephalus*; it differs fundamentally from *Murraytrema robustum* and *Murraytrematoides ditrematis* in the haptor anchors. Three mature specimens of *Pseudamphibdella paralichthydis* n.g., n.sp. were collected from the gills of *Paralichthys olivaceus*; although it resembles *Amphibdella torpedinis* the new form differs from it in lacking a vagina and seminal receptacle, in the relative position of the ovary and testis and in the anterior extent of the vitellaria. Megaloncidae n.superf. and Megalonicidae n.fam. are both made for *Megalonus arelisci* n.g., n.sp. from the gills of *Areliscus joyneri*; three gravid specimens were obtained; this new genus is characterized by the enormous development of the posterior haptor apparatus, which consists of three pairs of anchor complexes, the components of each complex articulating with one another and, in addition, the germiduct forms a very peculiar fusiform swelling. *Megalonus* appears to show a linkage between the Monopisthocotylea and the Polyopisthocotylea. *Osphyobothrus parapercis* n.g., n.sp. is based on a single mature but not gravid specimen from the gills of *Parapercis pulchella*. It is distinguished from *Diclidophora* by the absence of a seminal receptacle and the presence of a muscle bulb opening dorsally at the lower part of the back. *Microcotyle gimpo* n.sp. from *Enedrias nebulosus* is characterized by the pars prostatica which opens directly into the genital atrium at the tip of a hemispherical protuberance. *M. sebastisci* n.sp. was recovered from several fish, *Sebastiscus marmoratus* being the type host; it is compared with *M. tanago*, *M. caudata*, *M. ditrematis* and *M. sebastis* from which it differs in various morphological characters. *Prosomicrocotyla* n.g. is made for *Microcotyle gotoi* (type) and *M. chiri*, on the grounds of the spatulate body and the division of the haptor into two separate frills. *Axine* (*Axinoides*) *sebastisci* n.sp. from *Sebastiscus marmoratus* is not differentiated from related species. *Squalonchocotyle laymani* n.sp. from *Mustelus manazo* is identical with *Squalonchocotyle* sp. of Layman, 1931; it is differentiated from *S. somniosi* by the presence of a filament at each pole of the egg, from *S. sphyrynae* by the length of the hook of the haptor sclerite and from *S. catenulata* by the germiduct and the presence of two filaments on the egg. S.W.

278—Queensland Agricultural Journal.

a. WEBSTER, D. J., 1958.—“The tapeworm your dog can do without.” 84 (10), 607–609.

(278a) Webster briefly describes the species of dog tapeworms common in Queensland, which are *Dipylidium caninum*, *Echinococcus granulosus*, *Taenia hydatigena* and *Diphyllbothrium*

erinacei. Dog owners should help towards the control of these parasites by keeping fleas in check, burning offal, and treating infected dogs with arecoline hydrobromide. J.M.W.

279—Queensland Journal of Agricultural Science.

- a. COLBRAN, R. C., 1958.—“Studies of plant and soil nematodes. 2. Queensland host records of root-knot nematodes (*Meloidogyne* species).” 15 (3), 101–136.

(279a) Colbran records 269 plant species in Queensland attacked by root-knot nematodes: *Meloidogyne arenaria*, *M. hapla*, *M. incognita* and *M. javanica*. The records, most of which are new, are presented in two sections. The first is a host-nematode list with observations on severity of infestation, locality and in some cases susceptibility of test plants. In the second, relevant host plants are listed under each of the *Meloidogyne* spp. *M. javanica* is the most common and widely distributed species in Queensland (140 hosts), with *M. incognita* nearly as common (136 hosts). *M. arenaria* and *M. hapla* were found to be more limited in their host range with 31 and 29 hosts respectively. There are several photographs of various plants infested with root-knot. D.J.H.

280—Refuah Veterinarith. Jerusalem.

- a. DAVIDSON, M., 1958.—[Leech infestation in the Government beef herd at Karei Deshe.] 15 (1), 16–17. [In Hebrew: English summary p. 43.]

(280a) Heavy infestation of the oral cavity and gall-bladder with leeches [species not stated] was proved at autopsy to be the cause in a number of cases of sudden death of cattle in Israel. The surviving animals were weakened by haemorrhage and by haemolysis due to hirudin. Two old wells, from which the infested cattle frequently drank, were found to contain myriads of leeches. These water sources were closed. [*Limnatis nilotica* is common in this area.] J.M.W.

281—Report. Scottish Society for Research in Plant Breeding.

- a. CAMERON, D. & SPEED, D. W., 1958.—“Resistance in oats to attack by the stem eelworm *Ditylenchus dipsaci* (Kühn).” Year 1958, pp. 66–74.

(281a) In Scotland the oat variety Early Miller is resistant to attack in the field by *Ditylenchus dipsaci*. Tests in the field and in the laboratory using Seinhorst's injection method, on a number of hybrids of which Early Miller was a parent, *Avena ludoviciana* (resistant) and known susceptible varieties, confirmed the resistance of Early Miller. The various reactions of the plants to inoculated *D. dipsaci* are catalogued and discussed. Comparison with earlier published results of Goodey (1937) [for abstract see Helm. Abs., 6, No. 318c] and Griffiths *et al.* (1957) [for abstract see Helm. Abs., 26, No. 338a] are made. J.B.G.

282—Research Bulletin of the Panjab University, Hoshiarpur.

- a. GUPTA, N. K., 1958.—“On a new species, *Ceylonocotyle dawesi* from *Bos indicus* Linn., in Madras (South India).” No. 140 (Zoology), pp. 67–73.
 b. GUPTA, N. K. & BHARDWAJ, O. N., 1958.—“On two new trematodes of bats, *Lyroderma lyra* (Geoffroy) in Gurdaspur, India.” No. 141 (Zoology), pp. 75–79.
 c. GUPTA, N. K., 1958.—“On a new trematode of the genus *Haematotrephus* Stossich, 1902 from the air sac of *Lobivanellus indicus* (Boddaert) in India.” No. 144 (Zoology), pp. 107–111.
 d. GUPTA, N. K., 1958.—“On a new *Diplostomum* trematode from *Sterna aurantia* Gray in Hoshiarpur (India) and redescription of *Uvulifer stunkardi* (Pande, 1938) Bhalerao, 1942.” No. 145 (Zoology), pp. 113–117.

(282a) Gupta describes and figures *Ceylonocotyle dawesi* n.sp. from the rumen of *Bos indicus* slaughtered in Madras. Although, according to Näsmark, the new species could belong in the genera *Ceylonocotyle*, *Nilocotyle* or *Buxifrons* it is assigned to the first mentioned because of the importance of the genital sphincter and lip sphincter. *C. dawesi* is most closely

allied to *C. scoliocoelium*, but differs from it in the possession of a ventral atrium, in the oesophagus lacking an oesophageal bulb, in the acetabulum which is different in pattern, and in the ratio of the diameter of the acetabulum to the length of the body. S.W.

(282b) *Lecithodendrium* (*Lecithodendrium*) *minutum* n.sp., which Gupta & Bhardwaj describe and draw from a single specimen collected from *Lyroderma lyra* in the Punjab, is differentiated from all known species of the genus on the grounds that it possesses a pre-oral canal in front of the oral sucker. *Paralecithodendrium magnioris* n.sp., from the same host, resembles *P. ovimagnosum* and *P. lucifugi* in that the ovary is not narrower than the distance between the testes but differs from them and from the other species of the genus in having a much larger oral sucker, a shorter antero-posterior axis of the ovary and eggs measuring 0.019 mm. by 0.007 mm. S.W.

(282c) *Haematotrephus* (*Haematotrephus*) *lobivanelli* n.sp. is described and figured from the air sac of *Lobivanellus indicus* at Hoshiarpur. The new form differs from *H. (H.) lanceolatus* and *H. (H.) nittanyense* in having the genital pore slightly to one side of the median line and behind the pharynx and in the extent of the vitellaria which commence at the level of the base of the pharynx and reach to the posterior testis; it differs also from *H. (H.) similis* and *H. (H.) consimilis* in having smaller eggs and the ovary much smaller than the testes. S.W.

(282d) Gupta describes and illustrates *Diplostomum sterni* n.sp. from *Sterna aurantia* at Hoshiarpur. It is distinguished from *D. commutatum* by its smaller tribocytic organ, by the pharynx being smaller than the length of the oral sucker and by the ovary which is situated close to the intersegmental constriction. From *D. duboisi*, the Indian species it most closely resembles, *D. sterni* is distinguished by the size of the tribocytic organ, the larger pseudosuckers, the length of the pharynx and the host. *Uvulifer stunkardi* is redescribed and *Cardiocephalus halcyonis* Gupta & Dhillon, 1954 is given as a synonym. Slight morphological differences between these specimens and Pande's original description were observed. S.W.

283—Research and Experimental Record of the Ministry of Agriculture, Northern Ireland.

- a. TODD, J. R. & GRACEY, J. F., 1958.—“Experiments on cobalt nutrition of sheep.” **7**, 141–146.
- b. BAXTER, J. T., 1958.—“On the pattern of *Nematodirus* infection on pasture and in lambs.” **7**, 147–155.
- c. ANON., 1958.—“Agricultural Entomology Division. Report for 1957.” **7**, 157–165.
- d. ANON., 1958.—“Veterinary Research Division. Report for 1957.” **7**, 232–246.

(283a) Half the lambs in each of three hill flocks received 50 mg. cobalt chloride by mouth on three occasions during June and July. The remaining lambs served as controls. The lambs were weighed in groups in June and August and worm counts were made after the slaughter of six treated and six untreated lambs from two of the three flocks studied. The mean weights showed no difference between treated and untreated groups but the authors suggest on the basis of mean worm counts that the worm burden of the untreated lambs was greater than that of the lambs which received cobalt. H.D.C.

(283b) Larvae of *Nematodirus battus* and *N. filicollis* were found on herbage from February to May, maximum numbers being recorded in March. Larvae were again found in September. In lambs, eggs of these species were first recorded in April and there was a rapid increase in number during this month. The numbers then decreased until in July few eggs were detected. A second rise in egg count followed the September increase of larvae on herbage. From laboratory experiments the authors conclude that the autumn increase resulted from contamination of the pasture in spring. By stocking contaminated paddocks with lambs at different times it was shown that while the main danger of infection to lambs was during March to June, a delay in stocking until after April greatly reduced the amount of infection. Lambs infected in spring were not resistant to a second exposure in autumn. H.D.C.

(283c) Research included the screening of seedling potatoes for resistance to the potato-root eelworm and a survey of the eelworm populations to discover resistance-breaking strains. Experiments to investigate the influence of different cropping systems in the intensity of the potato-root eelworm population showed that the infection remained stationary under a non-host crop such as rye-grass, but increased as much as tenfold when potatoes were grown. Resistant potatoes affected a reduction of 75%, and this rate of decrease was maintained in the second year under this crop. Trials of oat varieties showed that the variety "Milford" (S225) was resistant to the stem and bulb eelworm *Ditylenchus dipsaci*. Details are given of the method of implementing the Potato Root Eelworm (Northern Ireland) Order. J.J.H.

(283d) In the parasitology section of this report it is noted that parasitic gastro-enteritis in young cattle in Northern Ireland was less common in 1957 than in 1956 whereas parasitic bronchitis of cattle remained wide-spread. Of 303 samples of beef suspected of infection with *Cysticercus bovis*, 152 had live cysts and 128 had dead cysts of the parasites. In sheep, gastro-enteritis was observed especially in those kept under lowland conditions of management. M.MCK.

284—Revista de Agricultura. São Paulo.

- a. MELLO, L. M. DE, 1958.—"Nematódeos que parasitam o melão cantalupe no estado de São Paulo." 33 (1), 39-44. [English summary pp. 43-44.]

(284a) Roots of *Cucumis melo* var. *cantalupensis* were found to be heavily infested with *Meloidogyne incognita*. The population differed from that described by Chitwood in having wider eggs and shorter tails in the pre-parasitic larvae. *Aphelenchus avenae* was demonstrated in stained roots and is considered to be parasitic in the melon. A single female of *Helicotylenchus nannus* was also found. M.T.F.

285—Revista de Biología Tropical. Universidad de Costa Rica.

- a. FLORES-BARROETA, L., HIDALGO, E. & BRENES, R. R., 1958.—"Céstodos de vertebrados IV." 6 (1), 55-78. [English summary pp. 64-65.]
- b. JIMÉNEZ-QUIRÓS, O., 1958.—"Algunas consideraciones sobre clonorquiasis sinensis y un método simple para su diagnóstico." 6 (1), 95-98. [English summary pp. 97-98.]
- c. JIMÉNEZ-QUIRÓS, O., BRENES, R. R. & VIETO, P. L., 1958.—"Parasitosis intestinal en el universitario costarricense. I. Helmintiasis." 6 (1), 113-122. [English summary pp. 121-122.]

(285a) Continuing their series of papers on cestodes of vertebrates, Flores-Barroeta and his colleagues give a detailed description of three species of *Oochoristica*: (i) *O. antrozoi* from the intestine of a lizard; (ii) *O. eumecis* from the intestine of the iguana; and (iii) *O. pennsylvanica* from the small intestine of the opossum, *Didelphys marsupialis etensis*. The scoleces of all three are usually globose but that of *O. pennsylvanica* is sometimes quadrangular due to certain folds which occur in the region of the suckers. The authors point out that there is a large number of synonyms in this genus and at present there are some 60 valid species. They then give their criteria for classification which are: (i) detailed morphology with measurements of the mature proglottis; (ii) detailed morphology and size of the gravid segments; (iii) morphology and size of the scolex including the form and structure of the suckers and their sizes, and the diameter of the scolex at the level of the suckers; (iv) the relation of the transverse diameter of the suckers to that of the scolex; (v) relation between the length of the cirrus pouch and the width of the mature segments. The authors also report the finding of *Taenia taeniaeformis* from the small intestine of cats in the city of San Jose. This is the first report of the adult of this species in Costa Rica. W.K.D.

(285b) Three cases of *Clonorchis sinensis* infection in Costa Rica are reported all of which were seen within one month of each other. All were Chinese from the Canton area who had previously attended clinics in North America for digestive disturbances, or loss of weight and nervous disorders, where a number of X-ray and laboratory tests had been

carried out. Two of the patients had then been diagnosed as suffering from "neurosis" and chronic hepatitis while the third was considered to be a case of hyperthyroidism. The author, in view of the patients' country of origin, and having treated another patient with similar symptoms, suspected *Clonorchis* infection, especially as there was evidence of damaged liver function and eosinophilia. Since in these chronic cases diagnosis is not always easy the patients were given parenterally 2 c.c. of a lipotropic-antitoxic compound which was intended to improve the conditions in the liver surrounding the trematode and so stimulate oviposition. The compound was given 48 hours before examination of the faeces by Ritchie's and Stoll's methods. Numerous ova of *Clonorchis* were found and the results are regarded as confirming the value of this method of diagnosis in chronic cases with much fibrosis and liver damage. [No details of treatment and its results are given.] W.K.D.

(285c) This is the first report on intestinal parasites in students at the University of Costa Rica and deals solely with helminth infections. The faeces of 1,000 male and 1,000 female students aged 17-20 years were examined by Ritchie's method. 484 males and 428 females were found positive as follows: (i) nematodes: *Trichuris* was by far the most common species occurring in 330 males and 314 females; *Ascaris* was next in importance, being found in 58 males and 70 females; *Ancylostoma* or *Necator* occurred in 58 males and 12 females; while *Enterobius* was found in only 2 females: (ii) cestodes: *Hymenolepis nana* was present in 16 males and 14 females; *Taenia* spp. in 6 males and 10 females. These findings were then compared with the results of clinical examination. In the nematode-infected group the commonest symptoms were headache, smarting of the conjunctivae and gastro-intestinal irritation, with dysmenorrhoea prominent in the female students; while in the cestode-infected allergic manifestations [not further detailed] were commonest with gastric disorders next. Intestinal parasites located close to the genital region appear to favour the development of dysmenorrhoeic symptoms and the female students were more sensitive to the aetiological agents. The frequent headache in combination with conjunctival irritation is regarded as indicating a toxic-allergic condition. In females the triad—headache, conjunctival irritation and dysmenorrhoea is regarded as warranting faecal examination with special reference to the possibility of *Trichuris* infection. [There is no reference to anaemia in the 70 cases positive for *Ancylostoma* or *Necator*. The blood picture was apparently not investigated. The triad of symptoms to which such frequent reference is made might perhaps be ascribed to other causes also.] W.K.D.

286—Revista Brasileira de Biologia.

- a. ZAGO FILHO, H., 1958.—"Pesquisa e contagem de ovos de *Physaloptera praeputialis* Linstow, 1889 em fezes de gato." **18** (2), 155-158. [English summary p. 158.]
- b. LORDELLO, L. G. E. & CESNIK, R., 1958.—"Alguns nematódeos do tomateiro." **18** (2), 159-165. [English summary p. 164.]
- c. FREITAS, J. F. TEIXEIRA DE, 1958.—"Breve nota sôbre o *Distoma monas* Rudolphi, 1819 (Trematoda)." **18** (2), 171-174.
- d. KLOETZEL, K., 1958.—"Observações sôbre o tropismo do miracídio de *Schistosoma mansoni* pelo molusco *Australorbis glabratus*." **18** (2), 223-232. [English summary p. 232.]
- e. LOBATO PARAENSE, W. & DESLANDES, N., 1958.—"*Taphius pronus* (Martens, 1873) (Pulmonata, Planorbidae)." **18** (4), 367-373.
- f. LORDELLO, L. G. E., 1958.—"*Meloidogyne incognita*, a nematode pest of fig orchards at the Valinhos region (State of S. Paulo, Brazil)." **18** (4), 375-379.
- g. KLOSS, G. R., 1958.—"Alótipo macho de *Stegonema stegonema* Travassos, 1954 (Nematoda, Thelastomatidae)." **18** (4), 409-411.

(286a) Zago has carried out experiments to determine the best methods for detecting eggs of *Physaloptera praeputialis* in the faeces of cats and to relate the eggs per gm. figures obtained using the Stoll counting technique to actual infection of adult worms. He finds that of 51 cats carrying the infection (proved by post-mortem examination) eggs could be demonstrated in the faeces of all of them using a sedimentation in tap-water technique but only in 41% when the zinc sulphate flotation technique was used and in only 37% by direct smear. The number of eggs per gramme of faeces per female worm varied between 400 and 580 with the mean at about 450. C.W.

(286b) Lordello & Cesnik found tomato roots at Piracicaba attacked by *Meloidogyne javanica* and by another species of the same genus ascribed to the *incognita* groups but having a "winged" perineal pattern. In the soil surrounding the roots were found: *Helicotylenchus nanmus*, *Rotylenchus* sp., *Xiphinema* sp., *Dorylaimus krygeri* and *Spirotylenchus queirozi* n.g., n.sp. The last is described and figured. The female has paired ovaries but the vulva at about 72%; the spear and oesophagus of the male are less developed than of the female and the male has a short adanal bursa. In both sexes the hind part of the oesophagus apparently overlaps the intestine for some distance; the phasmids are pre-mid-tail in position and the orifice of the dorsal oesophageal gland is midway between spear-base and median bulb. [All these characters suggest that the nematodes are a species of *Rotylenchulus* of which the adult females have not been observed.] J.B.G.

(286c) Freitas traces the history of the trematode known as *Distoma monas* Rudolphi, 1819 and presents a redescription based on new material from the intestine of *Amphisbaena* sp. As a result of this new investigation the species is transferred to *Mesocoelium* as *M. monas* (Rudolphi, 1819). C.W.

(286d) Kloetzel describes a series of experiments designed to investigate whether the snail *Australorbis glabratus* has a definite attraction for the miracidia of *Schistosoma mansoni*. The results lead him to the conclusion that there is a definite chemotactic process involved which can be at least partially inhibited by the introduction into the test dish of an extract of a crushed snail. C.W.

(286e) Paraense & Deslandes present a detailed redescription of *Taphius pronus* based on living material collected from the type locality. The structure of the prostate, in which the tubules are closely packed and arborescent, distinguishes *T. pronus* from its most closely related species. The authors have shown that this species is correctly placed in *Taphius* rather than in *Helisoma* to which it was at one time referred. C.W.

(286f) Lordello describes, with illustrations, *Meloidogyne incognita* from the roots of *Ficus carica*. Of ten males examined two differed in having a shorter head with two instead of three annules and the opening of the dorsal oesophageal gland at 3.3μ behind the stylet as compared with $3.7-4.6\mu$. The larvae were rather longer and relatively wider than those described by Chitwood. The author identifies this species as *M. incognita* but with some hesitation. M.T.F.

(286g) Kloss has re-examined a collection of nematodes from the gut of a Brazilian water-beetle. The collection was originally made and described by Travassos who referred the specimens to three species, *Toddia toddi*, *Pseudonymus vasi* and *Stegonema stegonema*, two of the species being represented by females only and the third by specimens of both sexes. Subsequent work by Kloss revealed that *T. toddi* was a synonym for *Pseudonymus leptocercus* and *P. vasi* was transferred to the genus *Gyoryia* and the males were described from another lot of material. The original collection of males proved to be a mixture of the three species and by elimination of the males of *P. leptocercus* and *G. vasi* it has proved possible to present a description of the males of *Stegonema stegonema* based on the type material. [No distinguishing characters are mentioned in the description.] C.W.

287—Revista Ibérica de Parasitología.

- a. LIZCANO HERRERA, J., 1958.—"Contribución al conocimiento de los *Oesophagostomum* del cerdo. *Oesophagostomum dentatum* (Rudolphi 1803), *Oe. granatensis* nov.specie, y *Oe. longicaudum* (Goodey 1925), nuevo en Europa." 18 (3), 221-226.
- b. LIZCANO HERRERA, J., 1958.—"Hallazgo de unas formas de *Sparganum* en un conejo de Granada." 18 (3), 227-232.
- c. TARAZONA VILAS, J. M., 1958.—"Contribución al estudio de las gliceromonofosfatasa en los platelmintos parásitos." 18 (3), 233-242. [English summary p. 240.]
- d. FLORES-BARROETA, L., HIDALGO, E. & DÍAZ-UNGRÍA, C., 1958.—"Cestodos de vertebrados V." 18 (3), 243-253. [English summary p. 251.]

- e. RUIZ DEL RINCÓN, E. C., 1958.—“Transmisión materno-fetal de anticuerpos ascaridianos.” **18** (3), 255-308.
- f. LÓPEZ-NEYRA, C. R., 1958.—“*Hymenosphenacanthus* nomen novum para *Sphenacanthus* López-Neyra 1942 (Cestode-Hymenolepididae) nee Agassiz 1837 (pez fósil).” **18** (3), 315.
- g. SIMÓN, F., 1958.—“Observaciones en la morfología de algunos Protostrongylinae (fases adulta y primera larvaria).” **18** (4), 397-404.

(287a) In *Oesophagostomum granatensis* n.sp. from the pig in Spain the spicules are 1.01 mm. to 1.16 mm. long, the gubernaculum is 90 μ long and the cervical papillae are located just anterior to the point where the oesophagus broadens. Lizcano Herrera also records *O. longicaudum* from Spain and this constitutes the first report of this species from Europe. The principal characters and body measurements of *O. granatensis*, *O. longicaudum* and *O. dentatum* are compared in a table. In almost all the characteristics tabulated the new species is intermediate between the other two. M.MCK.

(287b) Elongate, pedunculate specimens of sparganum larvae were found in a rabbit which had died of cysticerciasis in Spain. Some had a vesicle at one end reminiscent of a proceroid, but there were no hooks. One presented a slit similar to a bothridium. Lizcano Herrera names these worms *Sparganum cuniculi* [n.sp.?]. He suggests that spargana be defined as larvae capable of budding and which belong in most cases to unknown cestodes. He divides these larvae into two groups: one group, consisting of those which bud internally, represented by the sparganum described by Southwell & Prashad (1918), and the second group, consisting of those which bud externally and represented by all the other known forms. M.MCK.

(287c) Alkaline glyceromonophosphatase was found in the testes of *Fasciola hepatica* and the cuticle and subcuticle of *Dipylidium caninum*, *Taenia pisiformis* and *Moniezia expansa*. In *D. caninum* and *T. pisiformis* the concentration increased, but in *M. expansa* it decreased, as the segments matured and ripened. Acid glyceromonophosphatase was found in the vagina, cirrus canal, calcareous granules, cuticle and subcuticle of *T. pisiformis*, the cuticle and subcuticle of *M. expansa*, within the uterine capsules of *D. caninum* and in high concentration in the caecal walls of *F. hepatica*. No glyceromonophosphatases were found in *Dicrocoelium dendriticum*. M.MCK.

(287d) *Hymenolepis diminuta* was found in a new host, the rodent *Echimys semivillosus flavidus*, at Margarita Island, Venezuela and is redescribed. The authors record *Taenia taeniaeformis* from a cat in Caracas. M.MCK.

(287e) This paper on the transmission of *Ascaris* antibodies from mother to offspring in women and rabbits combined the material published in three previous papers by Ruiz del Rincón & González Castro [for abstracts of which see Helm. Abs., **27**, Nos. 48g, 58h, 58i]. M.MCK.

(287f) As the name *Sphenacanthus* given by López-Neyra to a hymenolepid genus in 1942 is a homonym of *Sphenacanthus* Agassiz, 1837 (a fossil fish), López-Neyra renames his cestode genus *Hymenosphenacanthus*. M.MCK.

(287g) Simón gives descriptions of the adults and first-stage larvae of *Protostrongylus rufescens* (Leuckart, 1865) and *Cystocaulus ocreatus* Railliet & Henry, 1907, the two most commonly recorded nematode parasites of sheep and goats in western Spain. One larva was found of *Muellerius capillaris* (Müller, 1889), which is shown to possess a cuticular flange similar to that of the first-stage larva of *C. ocreatus* but may be distinguished from the latter species by the form of the body and the shape of the caudal appendage. W.G.I.

288—Revista Kuba de Medicina Tropical y Parasitología.

- a. ANON., 1958.—“Sobre los antihelmínticos de amplio espectro.” **14** (7/12), 59.

(288a) The article describes six known proprietary brands of anthelmintics and the worm species in man which they are intended to treat. M.MCK.

289—Revue d'Élevage et de Médecine Vétérinaire des Pays Tropicaux.

- a. GRABER, M., 1958.—“ L'association dithiocarbamate de pipérazine-arséniate de plomb dans la lutte contre divers helminthes (cestodes et nématodes) du mouton.” 11 (1), 31–39. [English & Spanish summaries p. 39.]

(289a) A mixture of 125 mg. per kg. body-weight of piperazine dithiocarbamate and 1.0 gm. of lead arsenate per head was administered as a drench to 35 sheep of different weight and age groups infected variously with *Moniezia expansa*, *M. benedeni*, *Stilesia globipunctata*, *Avitellina centripunctata*, *Oesophagostomum columbianum* and *Haemonchus contortus*. The faeces of the treatment groups and 31 controls were examined for six days before and six days after dosage when counts were made of the number of *Oesophagostomum* and *Haemonchus* eggs present. The peak of anthelmintic effect was observed 48 hours after treatment and was largely terminated at 72 hours. Those animals that still harboured nematodes showed a progressive decline in egg count over the six post-treatment days. A cure rate of 92% was obtained. The larger animals tended to retain *Oesophagostomum* and *Stilesia* but in these instances an increase of dose to 140 to 145 mg. per kg. of piperazine dithiocarbamate and 1.2 gm. of lead arsenate was completely efficacious. O.D.S.

290—Revue Suisse de Zoologie.

- a. WILLIAMS, H. H., 1958.—“ Some Tetraphyllidea (Cestoda) from the Liverpool School of Tropical Medicine.” 65 (4), 867–878.

(290a) *Rhinebothrium euzeti* n.sp. from *Dasybatis* sp. differs from *Echeneibothrium urobatidium* and *E. hui* in the size of the cirrus pouch and in the form of the scolex, which possesses 78 loculi in each bothridium. Redescriptions are given of *R. flexile*, *R. burgeri*, *R. trygonis*, *R. rankini* and *Caulobothrium insignia*. The account, with 19 figures, is based on part of Southwell's collection of Tetraphyllidea. Williams states that most of the material investigated had originally been determined incorrectly as species of *Echeneibothrium*. H.H.W.

291—Sborník Vysoké Školy Zemědělské a Lesnické v Brně. Řada B. Spisy Fakulty Veterinární.

- a. RIZHIKOV, K. M. & ZAVADIL, R., 1958.—“ Druhá příslušnost nematodů rodu *Cyathostoma* získaných ze pštrosů emu.” 6 (2), 125–132. [German & Russian summaries pp. 131–132.]
 b. ŠIMŮNEK, J. & KLIMEŠ, B., 1958.—“ Studium rozdílů v anthelmintickém účinku dvou různých benzínů.” 6 (2), 197–201. [German & Russian summaries pp. 200–201.]
 c. LUCKÝ, Z., 1958.—“ Příspěvek k poznání tasemnic ryb jižní Moravy.” 6 (3), 203–212. [German & Russian summaries p. 211.]
 d. SCHANZEL, H., 1958.—“ Vliv teploty a vlhkosti na exogenní larvy plicnívek ovčí.” 6 (3), 213–218. [German & Russian summaries p. 218.]
 e. ZAVADIL, R., 1958.—“ První nález motolice *Echinocirrus suinum* (Ciurea, 1921) u černé zvěře v ČSR.” 6 (3), 219–223. [German & Russian summaries p. 223.]
 f. DYK, V., 1958.—“ Cysticercosa srnčí zvěře v ekologickém profilu.” 6 (4), 259–264. [German & Russian summaries pp. 263–264.]
 g. SCHANZEL, H., 1958.—“ Plicnívka *Cystocaulus ocreatus*, Raillet a Henry, 1907, u ovčí v ČSR.” 6 (4), 265–270. [German & Russian summaries p. 269.]
 h. LUCKÝ, Z., 1958.—“ Nález žábrolístů *Dactylogyrus baueri* Gussev, 1955 a *Heteronchocleidus buschkieli* Bychowsky, 1957 u ryb v akváriích ČSR.” 6 (4), 271–275. [German & Russian summaries p. 275.]

(291a) Rizhikov & Zavadil report on the taxonomic position of nematodes belonging to the genus *Cyathostoma*, which were found to parasitize the respiratory organs of emus in Moscow in 1946 and are now reported from the same host in Lešno. It was possible for the authors to infect some geese, a crane (*Grus grus*) and a stork (*Ciconia alba*), by feeding them with dew-worms found in the ground, where the infected emus had been raised. The species in question had been originally described as *Cyathostoma bouharti*. The authors, however, conclude that there is no morphological difference between this parasite of emus and *Cyathostoma bronchialis* of geese and ducks. N.J.

(291b) Šimunek & Klimeš have studied the curative effect of two different benzines: benzine Sz (synthetic) and Parama benzine (natural), in the therapy of ascaridiasis in chickens. 30 infected birds were treated. Parama benzine proved to be the more effective of the two. Having in view the fact that there is no apparent difference in their composition, the authors conclude that the anthelmintic effect of these drugs depends largely on the fraction distilling between 60°C. and 80°C. N.J.

(291c) Lucky describes and illustrates the cestodes from fish in southern Moravia. Immature proglottides and plerocercoids of *Triaenophorus nodulosus* were found in *Perca fluviatilis* and *Esox lucius*, while the latter also carried infection with *T. crassus*. *Bathybothrium rectangulum* was found in *Barbus barbus*, and *Proteocephalus cernuae* in *Acerina cernua*. *Silurus glanis* harboured *Proteocephalus osculatus* and *P. percae*. *P. torulosa* was found in *Leuciscus idus*, *L. cephalus* and *Barbus barbus*. N.J.

(291d) Schanzel reports on the influence of temperature and humidity on free-living larvae of lungworms from sheep. At temperatures between 0°C. and 10°C. the larvae of *Dictyocaulus filaria* remained viable but neither developed beyond the first stage nor moulted. At temperatures between 15°C. and 17°C. the first moult occurred on the fourth day, the second between the sixth and eighth days. At 20°C. to 22°C. the first moult took place on the second day and the second between the fourth and fifth days, while at 25°C. to 27°C. the former occurred on the first day and the latter on the third day. The maximum life-span of *D. filaria* larvae was: at 15°C. to 17°C., 63 to 66 days; at 20°C. to 22°C., 42 to 45 days; and at 25°C. to 27°C., 30 to 33 days. Experiments with samples of sheep faeces, containing larvae of *D. filaria*, *Muellerius capillaris* and *Protostrongylus kochi* put into a desiccator containing nitrate of calcium, at a temperature of 20°C. to 22°C. showed that *D. filaria* larvae died within 24 hours in hard faeces, within 48 hours in semi-dry, and within 72 hours in diluted faeces. Larvae of *M. capillaris* and *P. kochi* were unharmed under all these conditions. Similar experiments with the first, the second and the third stages of *D. filaria* larvae showed that they died after 18 to 24 hours, 36 to 48 hours and 84 to 96 hours respectively. The resistance of *P. kochi* and *M. capillaris* was greater than that of *D. filaria*. N.J.

(291e) Zavadiš describes in detail *Echinocirrus suinum* from a wild boar, found for the first time in Czechoslovakia in the region of southern Moravia. N.J.

(291f) Dyk discusses the ecology of cysticerciasis in roe deer. 12 of 150 males, coming from different regions, were found to be infected with *Cysticercus tenuicollis*, whereas only one of 51 females carried the infection. In no case did the intensity of infection exceed four cysticerci. The author explains the difference in the incidence of infection in the two sexes by the fact that males keep to the places frequented by dogs and foxes. N.J.

(291g) Schanzel reports on the distribution of *Cystocaulus ocreatus* in Czechoslovakia. From September 1956 to February 1958 8,406 sheep lungs were examined from 26 localities. *C. ocreatus* infection was found in the organs from 22 localities all situated in southern and eastern Slovakia and which are characterized by high temperature, low precipitation and long vegetation period. N.J.

(291h) Lucky reports on the occurrence of *Dactylogyrus baueri* and *Heteronchocleidus buschkieli* on fish in aquaria in Czechoslovakia. The former species was found on the gills of *Carassius auratus* and *C. a. macrophthalmus bicaudatus* from the aquaria of Brno zoological garden and the second on the gills of *Macropodus opercularis*, from the aquaria of the Institute of Agriculture and Forestry in Brno. Both parasites are described in detail. N.J.

292—Science. Lancaster, Pa.

- a. MILLER, P. M. & STODDARD, E. M., 1958.—“Increasing the hatching of eggs of cyst and rootknot nematodes with Nabam.” 128 (3336), 1429–1430.

(292a) Nabam (disodium ethylenebis dithiocarbamate) in water solution inhibits hatching of *Meloidogyne* eggs. On the other hand, in soil, Nabam increases hatching of *Meloidogyne* and *Heterodera tabacum* eggs. Experiments based on these results showed that by combining Nabam with a nematicide a more efficient control of *Meloidogyne* was obtained. H.R.W.

293—Soil Science.

- a. HUNTER, A. H., 1958.—“Nutrient absorption and translocation of phosphorus as influenced by the root knot nematode (*Meloidogyne incognita acrita*).” 86 (5), 245–250.

(293a) After growth for five weeks in sand culture at four levels of nutrient solution combined with three levels of inoculation with *Meloidogyne incognita* var. *acrita* and one series uninoculated, tomato plants were weighed and analysed for the elements phosphorus, potassium, nitrogen, calcium, magnesium, iron and copper. Dry weights of tops of non-infected plants were significantly greater than of infected plants, except those at the lowest nutrient level. At the highest nutrient level the most heavily infected plants were heavier than those at the two lower infection levels. Root weights differed significantly only at the highest nutrient level, when clean roots were heaviest followed by those of the highest inoculation rate. The only significant difference in the mineral content of the tops due to nematodes occurred in the element copper which was higher in infected than in non-infected plants. Significantly greater amounts of phosphorus were found in roots of all infected plants than in clean plants, but there were no differences associated with levels of infection. It is shown that at the two lower nutrient levels the rate of absorption of P^{32} was greatly reduced by infection, but it was little affected at the higher levels. There appeared to be no inhibition of translocation of P^{32} due to infection. Analysis of roots showed no differences in content of calcium, iron or copper but the nitrogen and magnesium content was significantly higher in the infected plants, and the potassium content was higher in all infected plants except those at the highest nutrient level. It is concluded that under the conditions of the experiment the detrimental effects of root-knot infection on the growth of tomato plants cannot be attributed to interference with absorption or translocation of mineral elements studied, but that in the field nutrient deficiency may arise by restriction of the volume of soil explored by the infected root system. M.T.F.

294—Span. London.

- a. FENWICK, D. W., 1958.—“Red ring of coconuts. A problem for the nematologist.” No. 2, pp. 5–7.

(294a) After outlining the history of red ring disease of coconuts in Trinidad, Fenwick describes the symptoms and the position in which the causal nematode, *Aphelenchoides cocophilus*, is found in the plant at different stages of the disease. Infection probably starts at the base of the tree and there are indications that the nematodes enter by way of the roots. *A. cocophilus* has been found in the soil of coconut plantations and might possibly enter the husks of fallen nuts and so be spread to new plantations. Not enough is known to recommend control measures but soil fumigation might be practicable. Further research into the biology and host-parasite relationships of the nematode is needed. M.T.F.

295—Svensk Frötidning.

- a. BINGEFORS, S., 1958.—“Sprides lusernnematoden med importerat frö?” 27 (10), 109–114.

(295a) In a preliminary field survey in some parts of Sweden stem nematode attacks have been found in many lucerne fields. Observations of damage caused by the nematodes seem to indicate that the nematode in many cases has been spread by seed. S.B.

296—Tierärztliche Umschau.

- a. WALL, G. VAN DER, 1958.—“Zur Frage des pränatalen Spulwurmbefalls beim Schwein.” 13 (2), 48–50.
b. ENIGK, K., 1958.—“Die Vorbeuge der Helmintheninvasionen bei Kälbern und Ferkeln.” 13 (4), 109–111.

(296a) In order to determine whether pre-natal infection of pigs with *Ascaris* is possible, Wall carried out experiments on four sows. Two to three weeks before farrowing each sow was given a dose of from 600 to 12,000 infective *Ascaris* larvae. Four stillborn piglets, one

which died soon after birth and one which was killed were carefully examined but no larvae were found. The remaining 17 piglets were subjected to faecal examination for ten weeks after birth; all were entirely negative for *Ascaris* ova. No pre-natal infection had therefore been demonstrated.

A.E.F.

(296b) Enigk points out that, while it is not yet possible artificially to immunize domestic animals against helminth infections, it is desirable to ensure that young animals are not exposed to heavy infection: it is not usually possible to rear them worm-free but if only light infections are acquired an immunity will gradually be built up without seriously affecting well-being. Enigk describes measures of stall and pasture hygiene which should be adopted to prevent calves and piglets becoming heavily infected with helminths. These measures include disinfection of stalls, rotational grazing, separate pasturing of calves and older cattle, and adequate nutrition.

A.E.F.

297—Tijdschrift over Plantenziekten.

- a. SLOOTWEG, A. F. G., 1958.—“Enkele ziekteproblemen bij bloembollen.” **64** (5/6), 445–451. [English summary pp. 450–451.]

(297a) In a review of problems associated with diseases of flower bulbs, Slootweg reports that for narcissus, hot-water treatment of bulbs gives almost complete control and that soil fumigation with D-D also gives good, though not complete, control of *Ditylenchus dipsaci*. D-D also gives good control of *Pratylenchus penetrans* and *Hoplolaimus uniformis* in soil. Hot-water treatment of iris bulbs checked *D. destructor* and is expected to give similar results with attack by *D. destructor* on *Tulipa* spp. and of *Aphelenchoides subtenuis* on crocus.

J.B.G.

298—Tobacco. New York.

- a. CLAYTON, E. E., GRAHAM, T. W., TODD, F. A., GAINES, J. G. & CLARK, F. A., 1958.—“Resistance to the root knot disease of tobacco.” **146** (18), 20–25; (19), 20–24.

(298a) The authors give a progress report of work on the breeding of tobacco resistant to *Meloidogyne incognita* (including *M. incognita* var. *acrita*) since 1935. Collections of 970 tobaccos from Mexico, Central and South America were tested for resistance and all but TI 706 were eliminated. After a series of backcrosses to a flue-cured variety, lines were selected giving highly resistant plants with most of the commercially desirable characters but with narrower leaves and lower yields than in the best varieties. In 1950 a resistant line was crossed with the allopolyploid *Nicotiana sylvestris* × *N. tomentosiformis* and F₁ plants with the largest leaves and highest root-knot resistance were backcrossed to a flue-cured variety. The progeny gave highly resistant lines and by 1954 nine lines homozygous for root-knot resistance with parentage Flue-cured × ((RK 42 × *N. sylvestris* × *N. tomentosiformis*) × Flue-cured) had leaves on an average one inch wider and 2.4 inches longer than those of flue-cured 402. The cross with the allopolyploid had eliminated linkage between resistance and small leaves. In subsequent generations from repeated backcrosses to susceptible flue-cured tobaccos segregation was very variable. Resistance was shown to be due to a single dominant gene pair but modifier genes apparently affected its expression and the situation varied in different crosses. 37 species of *Nicotiana* were repeatedly tested and nine showed distinct resistance, namely *N. alata*, *N. arvensis*, *N. glauca*, *N. longiflora*, *N. megalosiphon*, *N. noctiflora*, *N. nudicaulis*, *N. plum-baginifolia* and *N. repanda*. Attempts to transfer resistance from these species to *N. tabacum* did not succeed in producing any lines superior in resistance to those from the TI 706 material. In discussing their results the authors emphasize that further extensive research is required but that the development of usable root-knot resistance in tobacco presents many possibilities with respect to the whole tobacco disease situation in the Southern States.

M.T.F.

299—Transactions of the American Microscopical Society.

- a. FRIEDMAN, F. & KAGAN, I. G., 1958.—“A paper chromatographic analysis of *Nippostrongylus muris* larvae.” **77** (4), 365–372.
- b. HERLICH, H., 1958.—“Experimental infections of sheep with three species of gastro-intestinal nematodes of cattle.” **77** (4), 373–379.
- c. OLSEN, L. S., KELLEY, G. W. & SEN, H. G., 1958.—“Longevity and egg-production of *Ascaris suum*.” **77** (4), 380–383.
- d. ANTHONY, J. D., 1958.—“*Atractolytocestus huronensis* n.gen., n.sp. (Cestoda: Lytocestidae) with notes on its morphology.” **77** (4), 383–390.
- e. MACEY, R. W. & MOORE, D. J., 1958.—“The life cycle of *Opisthioglyphe locellus* Kossack, 1910, with a redescription of the species.” **77** (4), 396–403.
- f. OSWALD, V. H., 1958.—“Studies on *Rictularia coloradensis* Hall, 1916 (Nematoda: Thelazidae). II. Development in the definitive host.” **77** (4), 413–422.
- g. LAUTENSCHLAGER, E. W. & CHENG, T. C., 1958.—“*Larelmintha polyorchis* (Trematoda: Heterophyidae), a new fluke from the herring gull.” **77** (4), 451–454.

(299a) The authors describe their methods for the chromatographic analysis of *Nippostrongylus muris* larvae and the results they obtained. Five ninhydrin positive areas and two fluorescent areas were revealed in ascending and descending chromatograms. The areas were considered to be aspartic acid (confirmed), glutamic acid (suspected), glycine (confirmed), hydroxyphenyl amino-acid (suspected), glutamine (suspected) and an unidentified compound, and tryptophan (suspected). One of the fluorescent areas was probably a sugar. Chromatograms of living, frozen, lyophilized larvae and the water medium of frozen larvae were very similar in configuration. The hydrolysates of the same materials gave identical chromatograms except that hydrolysed material yielded at least one more spot in unidimensional chromatograms. Chromatograms of adult *N. muris* were also examined. K.H.

(299b) Herlich fed infective larvae of bovine strains of the stomach worms *Trichostrongylus axei* and/or *Ostertagia ostertagi* to lambs, and subsequently infected them with *T. colubriformis*. All infected animals averaged smaller weight gains than did the control group. Lambs infected by *T. axei* followed by *T. colubriformis* were most severely affected; but pathogenic effects due to *T. axei* alone were not as severe as those reported by other workers, possibly owing to the use of a different strain. The tests indicated that *O. ostertagi* does not become readily established in sheep, no worms being found in some of the infected lambs and relatively few in others; and worms recovered from lambs were stunted compared with those recovered from a calf. J.M.W.

(299c) Olsen *et al.* followed a natural infection with *Ascaris suum* in a pig, by daily observation of the total number of eggs produced and the number and condition of worms passed, from the initiation of egg-production to its termination. The infection lasted for 55 weeks, but the majority of the worms were expelled before the 23rd week. The authors concluded that each female worm produced nearly two million eggs daily, and that sufficient sperm was stored to inseminate at least a 16-week production of eggs. J.M.W.

(299d) Anthony describes and figures a new monozoic tapeworm—*Atractolytocestus huronensis* n.g., n.sp.—from *Cyprinus carpio* in the Huron river near Ann Arbor, Michigan. The new genus differs from most other genera of Lytocestidae in having post-ovarian vitellaria, from *Khawia* in that the uterus reaches a length of one half of the testes area, and from *Lytocestoides* in that the testes are in several layers and the uterus is relatively long. Search for the intermediate host of the new species was unsuccessful. J.M.W.

(299e) Macy & Moore report adult *Opisthioglyphe locellus* from shrews in Montana and northern Alaska. Life-history studies were carried out using immature stages occurring naturally in *Lymnaea bulimoides* collected in northern Oregon. Sporocysts and cercariae developed in this snail, and encystment took place both in the sporocysts and in a variety of aquatic insects, including larvae of beetles, caddis-flies and may-flies. Development to the adult stage occurred in hamsters but could not be induced in chicks, white mice or amphibians. The authors lay stress on the broad distribution pattern shown by this species. The precocious development of the metacercaria within the sporocyst is of especial interest. J.M.W.

(299f) Oswald describes observations on the development of *Rictularia coloradensis* after the third-stage larva is ingested by a definitive host. Development to the adult stage takes place direct, the third moult occurring during the fifth or sixth day following the experimental infection of laboratory mice. Males mature and females may be inseminated as early as ten days after infection. Eggs may be present in the uteri by the 21st day and in the faeces by the 23rd day. The worm burden appears to decrease as the age of the infection increases and would seem to be independent of the number of larvae ingested. Larvae were unable to develop to the adult stage in either the white-footed mouse (*Peromyscus leucopus*) or in white rats, although the third moult occurred about one day earlier than in laboratory mice in the former host. Attempts to infect the vole *Microtus pennsylvanicus* were not successful. J.M.W.

(299g) Lautenschlager & Cheng describe and figure *Larelintha polyorchis* n.g., n.sp. from the herring gull, *Larus argentatus*. The new trematode differs markedly from other genera of heterophyids in the multiple testicular condition, the pre-acetabular location of the vitellaria, and the anterior location of the primary uterine coils. In as much as the new genus does not meet the criteria of any of the sub-familial characteristics as presented by Ransom (1920), Morosov (1952) or Dawes (1956), the authors propose for its inclusion the erection of a subfamily Larelinthininae n.subf. having the triple complex of cardinal characteristics specified above. A new key to the subfamilies of Heterophyidae is given. J.M.W.

300—Transactions of the Royal Society of Tropical Medicine and Hygiene.

- a. STEWART, P. D., 1958.—“Filariasis simulating testicular tumour.” [Demonstration.] 52 (4), 295.
- b. GARNHAM, P. C. C. & LEWIS, D. J., 1958.—“Some parasites from British Honduras. 4. Microfilariae of toucans.” [Demonstration.] 52 (4), 296.
- c. YEH, L. S., 1958.—“On the identity of the filarial worms *Setaria hornbyi* Boulenger, 1921, and *Setaria thwaiti* Mönnig, 1933.” [Demonstration.] 52 (4), 297.
- d. YEH, L. S., 1958.—“The microfilaria of *Setaria equina*, the genotype of *Setaria*.” [Demonstration.] 52 (4), 298.
- e. THOMAS, A. D., 1958.—“Skin lesions in cases of onchocerciasis in horses in Northern Transvaal, South Africa.” [Demonstration.] 52 (4), 298.
- f. THOMAS, A. D., 1958.—“Microfilariae of an *Onchocerca* sp. in venous blood of horses.” [Demonstration.] 52 (4), 298.

(300b) A short, stumpy microfilaria, 60 μ in length, and a long species, 200 μ in length were found in the blood of the toucan *Rhamphastos sulfuratus sulfuratus* in British Honduras. Neither of these forms appeared to correspond with the microfilaria reported from *R. dicolorus* in Brazil (Carini & Maciel, 1916) or from *R. carinatus* in Mexico (Caballero, 1936). J.M.W.

(300c) *Setaria hornbyi*, as identified in recent literature, is not conspecific with the species of this name originally described by Boulenger in 1921 from the antelope, its normal host. Boulenger's species is a very large form, easily differentiated from other species of the genus by its peribuccal ring alone. The *S. hornbyi* in the literature is a heterogeneous collection of *Setaria* spp., while the true *S. hornbyi* has been known as *S. thwaiti* Mönnig, 1933. J.M.W.

(300d) *Setaria equina*, the genotype of *Setaria*, has sheathed microfilariae which circulate in the peripheral blood. J.M.W.

(300e) Skin lesions due to onchocerciasis in animals have not been previously described. Lesions of the external genitalia observed in geldings infected with microfilariae of a species of *Onchocerca* (*O. cervicalis*?) resemble those of “elephantoid scrotum” in human beings infected with *O. volvulus*. Eczematous conditions of the skin seen in infected horses are comparable to the erysipelatoid lesions in human onchocerciasis. J.M.W.

(300f) The finding of microfilariae of *Onchocerca* sp. in blood collected by bleeding from the jugular and/or mammary veins of five horses suggests that the alleged rare occurrence of *O. volvulus* microfilariae in human blood should be re-investigated. J.M.W.

300—Transactions of the Royal Society of Tropical Medicine and Hygiene (cont.)

- g. LAVOPIERRE, M. M. J., 1958.—“The development of *Loa loa* in the cells of the fat body of its insect host.” [Demonstration.] **52** (4), 300.
- h. DONE, J. & GIBSON, T. E., 1958.—“Experimental visceral larva migrans in the pig.” [Demonstration.] **52** (4), 302-303.
- i. MICHEL, J. F., 1958.—“Host resistance to intestinal worms.” [Demonstration.] **52** (4), 303.
- j. OLLERENSHAW, C. B., 1958.—“Climate and liver fluke disease in Anglesey.” [Demonstration.] **52** (4), 303.
- k. ROSE, J. H., 1958.—“Sheep lungworms.” [Demonstration.] **52** (4), 304.
- l. KESSEL, J. F., 1958.—“Control of non-periodic filariasis: film.” [Demonstration.] **52** (4), 306-307.
- m. AUDY, J. R., 1958.—“The localization of disease with special reference to the zoonoses.” **52** (4), 308-328. [Discussion pp. 329-334.]

(300h) Done & Gibson produced visceral larva migrans experimentally in pigs by administration of embryonated eggs of *Toxocara canis* in doses ranging from 10,000 to 250,000. Autopsy 2, 4, 8, 16, 32 and 64 days later showed that the larvae had migrated to all parts of the body, producing granulomatous lesions which were macroscopic in the liver, lung, kidney and heart. Clinical signs were stunted growth and nervous disease. Ataxia and posterior paresis beginning three weeks after infection was associated with lesions in the posterior lobe of the cerebellar vermis. J.M.W.

(300i) In *Trichostrongylus retortaeformis* infection of rabbits host resistance may be manifested as self-cure, which results in complete elimination of adult worms; inhibition of development of the infective larval stages; or protection, which prevents the establishment of newly acquired worms. The working of these three mechanisms of resistance was illustrated by a model in which water flowed through a number of tanks. J.M.W.

(300j) The life-cycle of *Fasciola hepatica* is limited by temperature during late autumn, winter and early spring; and by rainfall in summer. In wet summers, however, both factors are favourable, so that a large parasite population develops and outbreaks of the disease occur. Analysis of these two factors showed that a single expression may be derived which is of use in forecasting the incidence of the disease. J.M.W.

(300k) Six species of sheep lungworms are now known to be present in this country, namely, *Dictyocaulus filaria*, *Muellerius capillaris*, *Protostrongylus rufescens*, *P. brevispiculum*, *Cystocaulus ocreatus* and *Neostrongylus linearis*. Male worms of these six species were exhibited. J.M.W.

(300l) In 1949 30% of the population of the Society Islands carried microfilariae, 20% exhibited acute filariasis or lymphangitis, and 5 to 10% showed elephantiasis. Anti-mosquito measures and mass treatment with diethylcarbamazine have reduced the microfilarial rate to 1 to 6%, the average microfilarial density from 33 per 20 cu. mm. to 0.04 to 1.8, and the percentage of infective mosquitoes (in some districts) almost to zero. The film shown explained and justified the activities of the filariasis control organization. J.M.W.

(300m) In this fascinating paper Audy attempts [with considerable success] the difficult task of integrating host-parasite relationships with the conventional principles of animal ecology. After discussing biocoenoses and other animal assemblages and reviewing some relevant current hypotheses (including Pavlovski's "doctrine of nidality"), he outlines his own approach to the problem, and concludes that the problem of the topographic localization of infections resolves itself into the following questions: (i) What factors are involved in the topographic localization of specific parasites in their maintaining hosts? (ii) Do parasites adopt new (additional) maintaining hosts, or exchange one maintaining host for another? (iii) What factors are involved in the infection of incidental hosts and how does the topographic distribution of such infections compare with that of the infections in the maintaining hosts? (iv) Does man, as a species of animal, differ significantly from other animals as either the maintaining or incidental host of infections by parasites? If so, in what way, and why? (v)

300—Transactions of the Royal Society of Tropical Medicine and Hygiene (cont.)

- n. BUCKLEY, J. J. C., 1958.—“Tropical pulmonary eosinophilia in relation to filarial infections (*Wuchereria* spp.) of animals. Preliminary note.” 52 (4), 335–336.
- o. HSÜ, H. F. & HSÜ, S. Y. LI, 1958.—“The prepatent period of four geographic strains of *Schistosoma japonicum*.” 52 (4), 363–367.
- p. NELSON, G. S., 1958.—“Onchocerciasis in the West Nile District of Uganda.” 52 (4), 368–376.

What is the relationship between topographic distribution of overt disease and that of the responsible pathogen? Audy dismisses question (v) as outside the scope of the paper and then attempts to throw some light on the remaining four by discussing parasitism and evolution in relation to biocoenoses and, ultimately, the terrain or landscape. After comparing the predatory and parasitic modes of life, he goes on to treat of the host-parasite assemblage and its evolution, including choice of food-chain links or of co-existing species, evolution of the host-parasite assemblage as a whole, and parasite-patterns of individuals, populations and species; the occupation of ecological niches, in relation to domiciliation, including a comparison of the same niche in different biocoenoses, an ecological grouping of parasites, and a discussion of domiciliation and domestication; and host response, both phenotypic and genotypic, in relation to migration of hosts and to insusceptible, susceptible and responsive hosts. He then proceeds to consider zoonoses in relation to terrain; and concludes with a discussion of the topographic localization of established host-parasite systems, the adoption of new hosts, and the infection of man as an incidental host. The following special points are stressed: (i) The disease-pattern as an expression of the larger parasite-pattern. (ii) A working definition of parasites based on the reversal of Elton's “pyramid of numbers”. (iii) The importance of mosaic vegetation and fringe-habitats. (iv) The usefulness of grouping parasites into host-, nest- and field-dwelling types. (v) The fundamental difference between maintaining and incidental hosts. (vi) The localization of human diseases with special reference to localization of infections among maintaining hosts in nature; extension of parasites to new maintaining hosts; and social aspects of contact with existing parasite-systems. (vii) The significant difference between man and animals in type of disease-pattern. In the discussion which followed the paper Dr. Audy emphasized that the ecological outlook can make an important contribution to the complex problems of preventive medicine [a comment which applies with particular force to helminthic diseases].

J.M.W.

(300n) Studies by Danaraj in Singapore on this disease have suggested that as blood infection is absent but the complement fixation test is positive and hetrazan efficacious, tropical pulmonary eosinophilia may be due to infection with a filaria of animal origin, e.g. *Setaria* spp. One volunteer was inoculated on two occasions with infective larvae obtained from mosquitoes which had fed on a monkey and a cat naturally infected with *Wuchereria* spp. A natural infection was not produced, but in each instance most of the accepted diagnostic features of tropical pulmonary eosinophilia were found some weeks after inoculation.

W.K.D.

(300o) The prepatent periods of Chinese, Formosan, Japanese and Philippine strains of *Schistosoma japonicum* were compared by infection of a series of albino mice with 30 cercariae of each sex. The results showed that the periods of the Japanese and Philippine strains fell into a short group, and those of the rest into a long group. The differences were statistically significant. The prepatent period of the Formosan strain varies according to the susceptibility of the host species.

W.K.D.

(300p) Four villages in the valley of the Nyara river were surveyed for onchocerciasis. Infection and density rates were obtained from skin snips which were taken from the upper thigh, a preliminary investigation having shown maximum density to be in this area. Males showed a higher incidence and concentration of microfilariae than females, and in two villages all males over 40 years old were infected. There was a progressive increase in infection rate and number of nodules with age. Onchocercal dermatitis, especially of the pelvic region, was very common. 90% of 439 nodules from 143 patients were found in this region and none from the head, forearm or below the knee. The incidence of blindness was low (12 cases out

300—Transactions of the Royal Society of Tropical Medicine and Hygiene (cont.)

- q. O'BRIEN, W., 1958.—"Symposium on onchocerciasis." [Correspondence.] 52 (4), 390.
- r. HUTTON, P. W., 1958.—"Symposium on onchocerciasis." [Correspondence.] 52 (4), 390-391.
- s. FORSYTH, D. M., 1958.—"Practical difficulties in the treatment of schistosomiasis in an Arab community. A review of over 200 cases treated by various methods." 52 (5), 439-445.
- t. RODGER, F. C., 1958.—"Comparison of the effect upon onchocerciasis of five drugs and selection of the one best able to prevent ocular complications." 52 (5), 462-467.

of 1,275 persons) but of 269 proved infections in persons ten years old or more, eight had eye changes. Many of the affected persons had also enlarged inguinal and femoral glands. *Simulium neavei* prefers to bite below the knee. W.K.D.

(300q) A recent survey of the Ghana army has shown not only a high incidence of onchocerciasis in men from the north of the country but also in Southern Ghanians from the tropical forest area stretching from the lower Volta to Ashanti. Eye lesions have not been reported. W.K.D.

(300r) From the Mulago Hospital, Kampala, Uganda, Hutton points out that diethylcarbamazine alone is not curative in onchocerciasis; but the marked reactions can be controlled with prednisone. In his experience antrypol in onchocerciasis and trypanosomiasis does not produce optic atrophy but suramin should be given with caution starting with 0.25 gm. doses and gradually increasing. The possibility of albuminuria should be kept in mind with this drug. W.K.D.

(300s) Schistosomiasis is not endemic in Kuwait but although the possibility is stated to be minimal, seven out of 217 patients were thought to have contracted their infection there although no snails capable of harbouring the sporocysts were found in the oases. Of the 217 patients 207 had *Schistosoma haematobium*, 12 *S. mansoni* and one a mixed infection; they were divided into groups and treated by the following methods: (i) various dosages of tartar emetic and sodium antimony tartrate, including intensive one-day, two-day, five-injection and six-injection courses; (ii) miracid D; (iii) anthiomaline; (iv) combined five-injection course of sodium antimony tartrate with miracid D; (v) stibophen; (vi) arsenoxide. Criteria of cure were: (i) urine—three centrifuged specimens negative on three successive days at three and six weeks and three months; (ii) faeces—five specimens negative microscopically at the same time intervals. Viability of eggs was tested by appearance and hatching. A number of patients defaulted, some were lost sight of and one died. Reactions from the antimony tartrates were considerable. The results were poor but the course of 12 mg. of sodium antimony tartrate per 54 kg. body-weight intravenously 12-hourly for five injections was the best, provided that the patient was in hospital. For out-patients anthiomaline, three intramuscular injections weekly to a total of 40 c.c. was valuable. Density of infection (i.e. number of ova voided) is not an important factor in prognosis. The low percentage of cures may be due to variations in the species and strains of the parasite. W.K.D.

(300t) A report is given of the results of treatment of onchocerciasis with the following drugs: cyanine, arsenamide sodium, sodium antimony tartrate, diethylcarbamazine, suramin. The criteria of cure adopted were: (i) adult worms—immobility after gentle dissection of the nodule in warm saline; (ii) microfilariae—complete immobility in the female vector and in the nodule fluid. Except for diethylcarbamazine all the drugs were given intravenously. One week after cessation of treatment all the nodules from the patient were dissected out at the same time and the individual density figure (IDF) estimated. A number of the patients refused excision. No drug was effective against the adult worms. Diethylcarbamazine completely killed the microfilariae, suramin was not quite so lethal. The other drugs were unsuccessful. Complications of diethylcarbamazine included fever, pruritus, and painful swollen knees. To keep the IDF below the level at which ocular complications may occur (below six) diethylcarbamazine as the dihydrogen citrate should be given, 10 gm. twice per year. Cases with head nodules should have these excised at once and three courses of the drug given for the first year, subsequently reducing to two per year. W.K.D.

300—Transactions of the Royal Society of Tropical Medicine and Hygiene (cont.)

- u. GILLIES, M. T., 1958.—“*Simulium* in Southern Arabia.” [Correspondence.] **52** (5), 475.
- v. WILSON, T., EDESON, J. F. B., WHARTON, R. H., REID, J. A., TURNER, L. H. & LAING, A. B. G., 1958.—“The occurrence of two forms of *Wuchereria malayi* in man.” [Correspondence.] **52** (5), 480-481.
- w. BUDDEN, F. H., 1958.—“The aetiology of the ocular lesions associated with onchocerciasis. (An assessment of the Symposium on Onchocerciasis).” **52** (6), 500-508.
- x. AZAR, J. E., SCHRAIBMAN, I. G. & PITCHFORD, R. J., 1958.—“Some observations on *Schistosoma haematobium* in the human rectum and sigmoid.” **52** (6), 562-564.
- y. TORREALBA, J. F., SCORZA, J. V. & DAGERT B., C., 1958.—“The experimental infection of some wild mammals from Venezuela with *Schistosoma mansoni*. I. Studies on the susceptibility of wild mammals from an epidemiological point of view.” **52** (6), 565-569.

(300u) Gillies reports the findings of pupae of *Simulium ruficorne* at two sites in the Western Aden Protectorate. This is believed to be the first record from the Arabian peninsula. W.K.D.

(300v) Morphological and ecological comparison of two forms of *Wuchereria malayi* in man showed considerable differences. One showed nocturnal periodicity, while the other was semi-periodic, and here infections could be found at all times. The nocturnal form did not develop readily in *Mansonia longipalpis* nor, on experimental infection, in cats while natural infections of these animals were rare. The differences between the two forms are tabulated. W.K.D.

(300w) Budden is an ophthalmologist who refutes the argument previously put forward at the symposium on onchocerciasis that this disease is not a major cause of blindness. There is an extensive description of the lesions found. W.K.D.

(300x) The authors report the results of urine examination and sigmoid and rectal biopsy in Bantu adolescents aged 12 to 19 years in certain schools of the Eastern Transvaal in areas where both *Schistosoma haematobium* and *S. mansoni* are highly endemic. Out of 263 patients whose urine was examined, 242 were found positive for *S. haematobium* and only two positive for *S. mansoni*. 224 biopsy specimens were positive for *S. haematobium* ova; but in only 13 were the ova viable. 161 specimens were positive for *S. mansoni* ova of which 147 had viable ova. The anatomical arrangements permitting such a distribution are considered. W.K.D.

(300y) Twelve species of wild mammals from the north-central region of Guarico State, Venezuela, were experimentally infected with cercariae of *Schistosoma mansoni* to test their susceptibility and importance as potential reservoirs. Three species of aquatic habits received 10,000 cercariae each and the remainder 5,000 each. Fifty days later they were killed and tissue samples from the viscera were examined histologically. In addition the contents of the colon and rectum were examined at necropsy for fresh ova. The results showed that the host mammals could be classified in four susceptibility groups. The first group consisted of the dog-like form *Cerdocyon thous*. The second group consisted of the rabbit-like species *Sciurus granatensis griseogena*, *Calluromys trinitatis venezuelae*, *Cuniculus paca*, *Sylvilagus floridanus valenciae* and *Dasyprocta rubrata*. The third group, designated as hamster-like, included the monkey *Cebus nigrivittatus*, the raccoon *Herpailurus yaguarondi*, the opossum *Didelphis marsupialis*, and the rodents *Echimyus semivillosus punctatus* and *Hydrochoerus hydrochoeri*. Both dog-like and rabbit-like mammals were readily penetrated by the cercariae but there was no development in the former, and incomplete genital development in the latter with no ova in the faeces. In the hamster-like group there was a heavy yield of sexually mature worms with viable ova in the faeces. A fourth group included peccaries which had an infection rate higher than 60% with large numbers of viable ova in the faeces. *Didelphis marsupialis* seems to act as a moderate host, but peccaries (*Pecari tajacu torvus*) were by far the best hosts. The authors consider that this species is an excellent potential reservoir by reason of its wide distribution and habits. They consider that an extensive epidemiological investigation of this species is necessary. W.K.D.

301—Tropical Agriculture. Trinidad.

- a. THROWER, L. B., 1958.—“Observations on the root-knot nematode in Papua-New Guinea.” **35** (3), 213–217.

(301a) Twenty hosts of root-knot nematodes have been recorded in Papua (New Guinea), the following being new records: *Meloidogyne incognita* on *Tephrosia candida*; *M. incognita* var. *acrita* on *Mimosa invisa*, *Phaseolus mungo*, *Hibiscus esculentus*; and *M. javanica* on *Leucaena glauca* and *Phaseolus calcaratus*. *Meloidogyne* sp. (unidentified) is recorded for the first time on *Solanum mammosum*. There appears to be a little root-knot in primary forest areas. *Leucaena glauca* is grown as a shade tree in cacao (*Theobroma cacao*) plantations. Chopped galls containing *M. javanica* from this host were used as inoculum on seedlings of *Trinitario cacao* but no damage appeared. Of five leguminous cover crops inoculated with *M. javanica* and *M. incognita* var. *acrita* no galls developed on *Crotalaria anagyroides*, *Pueraria phaseoloides* or *Leucaena glauca* while *Phaseolus calcaratus* and *P. mungo* were galled by both species of root-knot nematode.

M.T.F.

302—Tropical and Geographical Medicine. Amsterdam.

- a. DIJK, W. J. O. M. VAN, 1958.—“Transmission of *Wuchereria bancrofti* in Netherlands New-Guinea.” **10** (1), 21–33. [Spanish summary p. 33.]
- b. ASSEM, J. VAN DEN & METSELAAR, D., 1958.—“Host-plants and breeding places of *Mansonia (Mansonioides) uniformis* in Netherlands New-Guinea.” **10** (1), 51–55. [Spanish summary p. 54.]
- c. VERVOORN, J. D., 1958.—“An epidemic of *haematobium* schistosomiasis.” **10** (1), 93–95. [Spanish summary p. 95.]
- d. VERVOORN, J. D., 1958.—“Acute necrosis of the scrotal skin.” [Correspondence.] **10** (1), 96.
- e. VERVOORN, J. D., 1958.—“Treatment of schistosomiasis.” [Correspondence.] **10** (1), 97.
- f. BEUKERING, J. A. VAN, 1958.—“Treatment of schistosomiasis.” [Correspondence.] **10** (1), 97.

(302a) Dijk found that epidemiological relationship between malaria and filariasis resulting from the existence of common vectors was lacking in the Bamgi-Ia region of Mappi province of Netherlands New Guinea. Malaria is non-endemic by reason of the virtual absence of anophelines, whereas bancroftian filariasis is hyperendemic. Experimental infections with *Microfilaria bancrofti* were successful and development to the infective larval stage occurred in *Mansonia uniformis*, *M. papuensis* and *Culex squamosus* but not in *M. longipalpis*, while comparable tests with *M. crassipes* gave uncertain results. Natural infection was not observed. As a result of a survey of the mosquito population and a study of the biting habits of the species found, it was concluded that only *M. uniformis* and *M. papuensis* can have any significance as vectors of filariasis. In view of the prevalence and probable vector importance of this group of non-anophelines and of their exophilous habits, the eradication of filariasis by indoor spraying with insecticides is not likely to be successfully achieved, and other control methods must be sought. This is likely also to be the case in certain other parts of New Guinea, where landscape patterns similar to that existing in the Bamgi-Ia region are found.

J.M.W.

(302b) Van den Assem & Metselaar collected large numbers of larvae of *Mansonia uniformis* (an efficient local vector of *Wuchereria bancrofti*) on the following host plants in shallow flooded areas (rawahs) in southern New Guinea: *Hydrocharis* (?) *parvula*, *Monochoria vaginalis*, *Utricularia* sp., *Ipomoea aquatica* and a small, floating fern (probably *Azolla* sp.). The larvae were detached from the host plant by washing in a large, white enamelled pan, from which they were removed with a pipette. They showed a tendency to hide among the debris on the bottom of the pan. In the laboratory they attach themselves to the young roots of any kind of plant submerged near them, and are restless, rising repeatedly to the surface, when placed in jars without vegetation. No preference was shown for the roots of *Pistia stratiotes*, when a choice was offered.

J.M.W.

(302c) Vervoorn describes an epidemic of schistosomiasis haematobia among a group of Europeans working for a timber concern in West Africa. Case reports are given. Stibophen

treatment was effective. The infected men all swam regularly in a small river known to be infested with vector snails and frequented by infected native labourers. The immediate cause of the epidemic was not clear, but the opening up of an area of virgin jungle upstream and a decrease in the flow-velocity of the river may have been contributory factors. Sporadic swimmers and non-swimmers in the community remained free of infection. J.M.W.

(302d) Vervoorn considers that filariasis (whether due to *Wuchereria bancrofti* or *Onchocerca volvulus*) is not a cause of scrotal gangrene in Ghana. J.M.W.

(302e) In commenting on Van Beukering's suggested use of sodium antimonyl gluconate in the treatment of schistosomiasis haematobia [in *Documenta de Medicina Geographica et Tropica*, 1957, 9, 259-260.] Vervoorn recommends a six-months' post-treatment follow-up before assessing the results of treatment with any drug. J.M.W.

(302f) Van Beukering claims that sodium antimonyl gluconate is speedily effective in rendering the urine egg-free in cases of schistosomiasis haematobia. He has greater expectations of it than of stibophen. J.M.W.

303—Ugeskrift for Landmaend.

a. ANDERSEN, S., 1958.—“Havreålens betydning og bekaempelse.” 103, 655-660.

(303a) Andersen has found that a decrease in yield of oats is caused even by a low degree of infestation by oat nematode in the soil. There are no valuable resistant oat varieties but some differences between varieties have been found. There are a few resistant barley varieties. However, it has been shown that there are at least two different strains of the nematode, one of them (strain 2), attacking the varieties Drost and Alfa which are resistant to the other oat nematode strain (strain 1). The variety Kron has some resistance both to strain 1 and 2. The occurrence of these two strains in Danish soils and the influence on the nematode population by growing one or another barley variety is discussed. S.B.

304—Växtskyddsnotiser.

a. JOHANSSON, D., 1958.—“Växtsjukdomar och skadedjur i Skåne-Halland 1958.” 22, 64-68.

(304a) From south Sweden the oat nematode (*Heterodera major*) is reported as a severe parasite in some places. Symptoms of nematode attacks have been very obvious in 1958. S.B.

305—Věstník Československé Zoologické Společnosti.

- a. PROKOPIČ, J. & ŽDÁRSKÁ, Z., 1958.—“Suchozemští plži *Arion rufus* (Linné, 1758) a *Vitrina pellucida* (Müller, 1774) mezihostitelé tasemnice *Anomotaenia subterranea* Cholodkowsky, 1906.” 22 (1), 1-5. [German & Russian summaries pp. 4-5.]
- b. ERGENS, R., 1958.—“Nález monogenetické motolice *Pseudacolpenteron pavlovskii* Bychowsky et Gussev, 1955, na žábrech *Cyprinus carpio* L. v SČR.” 22 (1), 94-96. [German summary p. 95.]
- c. RYŠAVÝ, B., 1958.—“Helmintofauna kormoránů (*Phalacrocorax carbo* L.), hnízdicích v Československu.” 22 (2), 121-129. [German & Russian summaries pp. 127-129.]
- d. ERHARDOVÁ, B., 1958.—“Morfologická proměnlivost motolice *Plagiorchis arvicolae* Schulz et Skworzov 1931 a *Pl. proximus* Barker 1915 (Trematoda—Plagiorchiidae).” 22 (3), 266-278. [German & Russian summaries pp. 276-277.]

(305a) Prokopič & Zdárská report on the occurrence of *Anomotaenia subterranea* cysticerci in *Arion rufus* and *Vitrina pellucida*. Three of 24 *A. rufus* were infected with 30 to 500 cysts, most of which were localized in the respiratory tract although a few were found in the intestine and the hepatopancreas. Two out of six *V. pellucida* harboured one to 12 cysts, mainly situated in the hepatopancreas. The larvae were identified with adult worms found in *Sorex araneus*. N.J.

(305b) Ergens reports that one of several specimens of *Cyprinus carpio* examined in the Brno-Kamino region showed branchial infection with *Pseudacolpenteron pavlovskii*. The

author gives a description of the parasite with illustrations. The rest of the fish showed infection with *Dactylogyrus anchoratus*, *D. extensus* and *D. minutus*. N.J.

(305c) Ryšavý reports on the helminth fauna of 12 *Phalacrocorax carbo* caught near Bratislava, giving detailed descriptions and illustrations of the parasites found. *Paryphostomum radiatum* occurred in 10 of the birds examined. Four cormorants harboured a new species in the small intestine—*Parastrigea slovacica* n.sp.—which resembled *P. anatis*, but differed from it in being smaller, in having the anterior part of the body enlarged and rounded, and in possessing a smaller pharynx and acetabulum. *Paradilepis scolecina* was found in six birds and *Contracaecum* (*Contracaecum*) *spiculigerum* in nine. N.J.

(305d) Erhardová discusses morphological variation in *Plagiorchis arvicolae* and *P. proximus*. The former was found in *Arvicola terrestris* and the latter in this host and also in *Ondatra zibethica*. The author gives numerous illustrations of the two helminth species; morphological variations in both species involved: (i) the size and the form of the body which was much enlarged in the region of the gonads in some specimens and could be entirely or partially covered with spines, or completely smooth; (ii) the size and position of the oral sucker which could be terminal or subterminal and the size of which, relative to the acetabulum, was variable; (iii) the form of the pharynx, which could be wider than long, and of the oesophagus, which was sometimes lacking; (iv) the position and form of the testes, which could be placed transversely or in linear series; variable in their position relative to the ovary; and spherical, oval or irregular in form; (v) the form and size of the cirrus sac, which could be near the acetabulum or reach its posterior side, and (vi) the position of the ovary relative to the acetabulum and its size relative to the pharynx. From the variation of the position of the yolk glands the author concludes that some specimens of *P. (Multiglandularis) arvicolae* should be included in *P. (Plagiorchis)*. N.J.

306—Veterinaria. Milan.

- a. MICHI, V., 1958.—“L'ascaridiosi dei cavalli. Clinica e terapia.” 7 (1), 14–18. [English, French & German summaries p. 18.]

(306a) After giving an account of *Parascaris equorum* and its pathogenic effects in horses, Michi describes experiments in treatment using Elmifarma, a piperazine-carbon disulphide complex, at the rate of 100 mg. per kg. body-weight. 95% to 100% of worms present were thus eliminated. J.M.W.

307—Veterinaria. Sarajevo.

- a. CVJETANOVIĆ, V., BERBEROVIĆ, M. & MATANOVIĆ, D., 1958.—“Hepatitis infectiosa necroticans i latentne ricketsioze aktivirane metiljavošću kod ovaca u Livanjskom Polju.” 7 (1), 51–55. [English summary p. 51.]
- b. GAVEZ, E., 1958.—“Reducirani intenzitetni izražaji intestinalnog difteroida Newcastle-bolesti u toku koegzistentne tenijaze.” 7 (1), 57–59. [English & German summaries pp. 57, 59.]
- c. RUKAVINA, J., DELIĆ, S. & JOVOV, K., 1958.—“Prilog poznavanju helminata sirišta i tankog crijeva goveda u Bosni i Hercegovini.” 7 (1), 61–66. [English summary p. 61.]
- d. BOKO, F., 1958.—“Intradermalna ehinantienska reakcija kod teladi.” 7 (1), 95–101. [English summary p. 95.]
- e. PAVLOVIĆ, R., 1958.—“Prilog poznavanju parazitarne invazije u Semberiji.” 7 (1), 131–138. [English summary p. 131.]
- f. DŽUVIĆ, A., 1958.—“Anus praeternaturalis iliacus u toku fasciole jedne koze.” 7 (1), 139–141. [English summary p. 139.]
- g. DELIĆ, S. & JOVOV, K., 1958.—“Prilog poznavanju raširenosti vrsta ovčjih trihostrongilida u Bosni i Hercegovini.” 7 (2), 263–267. [English summary p. 263.]

(307a) The authors report an outbreak of acute fascioliasis with many fatalities in sheep in the Livanjsko Polje district of Yugoslavia in the summer of 1957. The affected sheep, all of which were adults over one year of age and all of which were heavily infected with young liver-flukes, fell into two main groups. In the first group in which there were practically no

symptoms and death occurred suddenly and quietly, the fluke infection was complicated by the presence of *Clostridium oedematiens*—causal organism of infectious necrotic hepatitis, previously unrecorded in this area. In the second group, the animals showed evident illness for several days before death, which was accompanied by convulsions. The authors consider that death in this group was due to latent rickettsiosis (heartwater) activated by the acute fascioliasis.

C.R.

(307b) Gavez reports his observations on the changes of the mucous membrane of the intestinal tract of poultry affected by tapeworms and subsequent Newcastle disease. Typical diphtheroid lesions did not develop in tissues in which tapeworms had previously provoked a catarrhal and inflammatory reaction, possibly owing to exhaustion of the ability to produce a local immune reaction.

C.R.

(307c) The authors report the results of the helminthic survey of 33 heifers carried out during the autumn of 1957. Only the abomasum and small intestine were examined. They report *Strongyloides papillosus*, *Bunostomum phlebotomum*, *Trichostrongylus colubriformis*, *Ostertagia ostertagi*, *O. occidentalis*, *O. lyrata*, *Cooperia punctata*, *C. oncophora*, *C. zurnabada*, *Marshallagia marshalli*, *Nematodirus helvetianus*, *Capillaria bovis* and *Moniezia* sp. *Marshallagia marshalli*, *O. occidentalis*, *T. colubriformis* and *C. bovis* are recorded for the first time in Yugoslavia; and the two first-named species are believed to be recorded for the first time in cattle.

C.R.

(307d) Boko carried out intradermal tests with *Echinococcus* antigen of bovine origin prepared from (i) desalbuminated fluid from fertile and sterile pulmonary cysts and (ii) fluid from fertile hepatic mother and daughter cysts. When these antigens were injected (in a dose of 0.2 c.c. to 0.3 c.c.) into the tail-fold and into the skin above the shoulder of calves born of heavily infected mothers, eight calves gave a positive reaction. Four calves from mothers either free or only very lightly and recently infected with hydatid gave negative results. Whether these antibodies are transmitted from mother to offspring by way of the placenta or through the colostrum according to the author remains an open question.

C.R.

(307e) Pavlović deals with the incidence of helminths in domesticated animals in the Semberija area. He reports *Thelazia* sp. and, as a result of faecal examination, *Fasciola hepatica*, *Dicrocoelium dendriticum*, lung strongyles, trichostrongyles, *Trichuris* and *Strongylus equinus* in cattle; *Parascaris equorum*, *Strongylus equinus* and *Oxyuris equi* in horses; *Ascaris suis*, *Macracanthorhynchus hirudinaceus*, *Trichuris* and *Strongylus equinus* and lung strongyles in pigs. The incidence of these infections is set forth according to locality in five tables. [*Strongylus equinus* is only cited as occurring in cattle and pigs in the English summary: this species or group of species is loosely referred to in the text as "intestinal Strongylus".]

C.R.

(307f) Džuvic describes the formation of an ectopic anus in the right iliac region of a goat as a result of adhesive peritonitis provoked by migration of young liver-flukes in the body-cavity.

C.R.

(307g) The authors report the occurrence of *Trichostrongylus axei*, *T. colubriformis*, *T. vitrinus*, *T. capricola*, *Cooperia curticei*, *Haemonchus contortus*, *Nematodirus filicollis*, *Ostertagia circumcincta*, *Marshallagia marshalli* and *O. occidentalis* in sheep in Yugoslavia. The last two are the first records for this country.

C.R.

308—Veterinaria Italiana.

- a. PELLEGRINI, D., 1958.—"La profilassi della cisticercosi bovina." 9 (1), 25-38.
- b. NARDI, E., 1958.—"Il tetracloruro di carbonio impiegato per via sottocutanea negli ovini affetti da elmintiasi." 9 (5), 423-429.

(308a) Pellegrini reviews the literature concerning the incidence of *Taenia saginata* infection in man and *Cysticercus bovis* infection in cattle in Europe since the war; and then goes on to discuss the methods to be adopted for the prophylaxis of these two complementary infections.

J.M.W.

(308b) Nardi treated five pigs and ten sheep for multiple helminthiasis by subcutaneous injection of 10 c.c. of a mixture consisting of one part carbon tetrachloride and three parts of sterile olive oil. Nematode infections of the gastro-intestinal tracts in both groups and *Paramphistomum* sp. in sheep were much reduced but *Dicrocoelium dendriticum* infection of the liver in sheep was not affected. The identity of the pig parasites is not stated but the sheep nematodes found were *Haemonchus contortus*, *Ostertagia* sp., *Trichostrongylus* sp., *Bunostomum trigonocephalum*, *Cooperia curticei*, *Nematodirus filicollis*, *Chabertia ovina* and *Trichuris ovis*.

J.M.W.

309—Veterinariya.

- a. LITVISHKO, N. T., 1958.—[The diagnosis of *Bilharziella* infection in domestic ducks.] 35 (9), 70–72. [In Russian.]
- b. ANON., 1958.—[Academician Konstantin Ivanovich Skryabin.] 35 (12), 9–14. [In Russian.]
- c. ALEKSANDROV, V., 1958.—[K. I. Skryabin—an untiring promoter of Soviet science.] 35 (12), 15–18. [In Russian.]
- d. MATOV, K., 1958.—[Academician Konstantin Ivanovich Skryabin—a member of the Bulgarian Academy of Science.] 35 (12), 19. [In Russian.]
- e. GOVORKA, Y. P., 1958.—[Academician K. I. Skryabin and helminthology of Czechoslovakia.] 35 (12), 20–22. [In Russian.]
- f. LUKINA, A. P., 1958.—[The influence of helminthiasis on the reproductive capacity of animals.] 35 (12), 32–35. [In Russian.]

(309f) Bulls and rams, selected for apparent infertility and infected to various degrees with helminths, became sexually active a few weeks after worming. A similar effect was demonstrated on the fertility of sheep. The experiments lead to the conclusion that even asymptomatic infections, by reducing the general good health of the animals, lower their reproductive activity and that the toxic products excreted by the worms act depressingly via the nervous system on reproductive reflexes, although a direct harmful effect of the toxins on the sperm has as yet to be experimentally confirmed.

G.I.P.

310—Veterinarski Arhiv.

- a. MIKAČIĆ, D., 1958.—“Dinamika fascioloze u toku godine 1957–1958.” 28 (9/10), 265–272. [English & French summaries pp. 271–272.]
- b. ILIJAŠ, B., 1958.—“Askaridoza svinje u rentgenskoj slici.” 28 (11/12), 327–332. [English & French summaries p. 332.]

(310a) Mikačić studied the development of *Fasciola hepatica* in the livers of several thousand sheep killed in abattoirs in Zagreb during 1957 and the first two months of 1958. He found that heavy infections began to occur at the end of July and were very frequent from August to the end of the winter. No significant difference was apparent in the size of young flukes recovered at different seasons. However, in February, when infection does not occur as animals are housed, significantly larger forms were found. The author observed that young flukes originating from the liver of cattle were larger, rarely measuring less than 6 mm., and by February have attained a length of 9 mm. to 10 mm.

C.R.

(310b) Ilijaš recommends the use of X-rays for the diagnosis of *Ascaris* infection in pigs. The parasites throw characteristic light silhouettes with sharp outlines on a dark homogeneous ground, so that their number can be determined. Dystonia of the small intestine is observed in heavy infections. The author thinks that the method may be useful in evaluating the efficacy of anthelmintics. The paper is illustrated by four photographs showing ascarids in the small intestine.

C.R.

311—Veterinary Record.

- a. MACKENZIE, A., 1958.—“Studies on lungworm infection of pigs. II. Lesions in experimental infections.” 70 (45), 903–906.
- b. ROSE, J. H. & KEYMER, I. F., 1958.—“An outbreak of ornithostrongylosis in domestic pigeons.” 70 (46), 932–933.

- c. JARRETT, W. F. H., JENNINGS, F. W., MCINTYRE, W. I. M., MULLIGAN, W. & SHARP, N. C. C., 1958.—"Use of X-irradiated larvae for immunisation of calves." [Correspondence.] **70** (48), 978.
- d. DOW, C., JARRETT, W. F. H., JENNINGS, F. W., MCINTYRE, W. I. M. & MULLIGAN, W., 1958.—"Use of X-irradiated larvae for immunisation of dogs." [Correspondence.] **70** (49, Pt. 1), 999.
- e. ALLEN, C. G., 1958.—"The role of the veterinary surgeon in public health." **70** (49, Pt. 2), 1130-1134. [Discussion pp. 1134-1138.]
- f. DALLING, T., 1958.—"The global picture of animal disease." **70** (49, Pt. 2), 1139-1147.
- g. POYNTER, D. & HUGHES, D. L., 1958.—"Phenothiazine and piperazine, an efficient anthelmintic mixture for horses." **70** (50), 1183-1188.
- h. TAYLOR, D. C., 1958.—"Cysticercosis in an oryx." **70** (51), 1207.

(311a) Mackenzie, in his work on the pig lungworm *Metastrongylus elongatus*, shows that there is a direct relationship between the extent and distribution of the lesions, occurring in experimentally infected pigs, and the number of larvae given in the infective dose. Clinical manifestations were only produced in heavily infected pigs which were given at least 8,000 larvae. K.H.

(311b) The four domestic pigeons examined out of seven which had died from among a group showing symptoms of listlessness and greenish diarrhoea were infected with *Ornithostrongylus quadriradiatus*, which apparently is reported for the first time for domestic pigeons in Britain. Features used for the identification are briefly described and illustrated. G.I.P.

(311c) Jarrett and his co-workers have reported obtaining a higher degree of protection against *Dictyocaulus viviparus* in calves which have received two doses of X-irradiated larvae given a month apart than in calves which had a single administration. Comparison is made between two groups of ten calves, one group being used as untreated controls and the other receiving two doses of X-irradiated larvae. On subsequent challenge with 10,000 infective larvae the untreated group showed 75% consolidation of the lungs whereas in the treated group no worms were found. The authors also report investigations on the protection given by the use of irradiated *Haemonchus contortus* larvae and have shown a marked decrease in the number of worms found in vaccinated animals after challenge. The figures quoted are after administration of 10,000 infective larvae irradiated with 10,000, 20,000, 40,000, 60,000 and 100,000 roentgens respectively followed by a challenge of 8,000 infective larvae, mean abomasal worm counts of 5, nil, 200, nil and 442 were obtained respectively in comparison with 2,042 in control animals. K.H.

(311d) Dow *et al.* administered 1,000 larvae of *Uncinaria stenocephala*, which had been subjected to 40,000 roentgens, to six dogs. These animals and six controls were given 1,000 normal infective larvae 128 days later. At autopsy, 22 days later still, the experimental animals yielded a mean of only 32 worms each, whereas the corresponding figure for the control group was 530. The authors suggest that a practical vaccination procedure for the induction of immunity to this and other hookworm infections may be developed. J.M.W.

(311e) It is not generally known that the veterinarian plays a part in public health work. This role includes preventing or eradicating diseases in animals, some of which can infect man, and inspecting live animals and carcasses to prevent unwholesome meat from being used for human consumption. In Britain the inspection of meat is required of imported carcasses but, surprisingly, is no compulsory in the case of meat produced in England and Wales. The incidence of *Cysticercus bovis* has increased in Britain since the war but few cases are generalized. At Birmingham abattoir 0.05% of 68,265 cattle in 1950 and 1.02% of 47,465 in 1957 were found infected. Allen points out the danger of selling, without control, raw meat from diseased animals for pets, and cites the danger to human beings that could arise from feeding offal infected with hydatid to a pet dog. In the discussion following the paper Bywater doubts the alleged harmful effects of imported frozen livers containing hydatid cysts; Dayus observes that New Zealand ceased exporting rejected livers when it was realized that there was not adequate control on them when they reached Britain. M.MCK.

(311f) In this account of some of the main diseases of farm animals throughout the world, Dalling touches lightly on internal parasites. He stresses the importance of collaboration between all interested in veterinary and agricultural subjects if internal parasitism is to be controlled. While most of the attention to the control of helminths seems to have been given to nematodes, medical and veterinary workers are effectively co-operating in a part of India where liver-fluke infects both people and animals. Here, men performing as clowns attract the villagers, then give a short talk on liver-fluke and invite the peasants to bring their animals on a particular day. The peasants are then encouraged, by the provision of a meal, to stay a whole day while tests are taken and both the animal and its owner are treated if necessary. M.MCK.

(311g) Critical tests of the efficiency of phenothiazine, piperazine and mixtures of these drugs were carried out in seven horses infected with a range of helminths. In two horses given 30 gm. phenothiazine only low efficiency was obtained against *Strongylus vulgaris* and *S. edentatus*. In a single horse given piperazine pyrophosphate all (nine) *S. vulgaris* present were expelled but this unexpected result was not confirmed in subsequent treatment of seven ponies given this drug. In two horses given mixtures of phenothiazine and piperazine, high efficiency was obtained against *S. vulgaris* and *S. edentatus*. Both drugs were almost 100% efficient against adult *Trichonema*. In two horses dosed with both drugs but with an interval between, piperazine was superior against *Parascaris* and *Trichonema* spp. The results against *Strongylus* spp. were not uniform. It was concluded that piperazine and phenothiazine given together produced better results against *S. vulgaris* and *S. edentatus* than either drug alone. O.D.S.

312—Veterinary Reviews and Annotations. Weybridge.

- a. SOULSBY, E. J. L., 1958.—“Immunity to helminths.” 4 (1), 1-16.

(312a) Soulsby reviews modern developments in the field of immunity to helminthic infections. He points out that this phenomenon usually manifests itself in one or more of the three following ways: (i) complete refractoriness to infection; (ii) elimination of an existing infection, as exemplified by “self cure” in intestinal helminthiases; (iii) depression of growth, development and reproduction. The antigenic stimulus for the production of protective immunity appears to be provided by metabolic materials associated with the living worm; hence satisfactory protective immunity is usually induced only by the presence of living worms in the host (premunity). Such antigenic metabolic products, by themselves, will induce immunity. The resulting protective antibodies probably produce their effect by inactivating essential enzyme systems of the parasite. They are, in general, non-absorbable by preparations of tissues of parasites but may be neutralized by the appropriate metabolic products. In all helminth infections certain specific stages are probably of outstanding importance both in stimulating and in being affected by immune processes. Retardation may result in young helminths becoming dormant in the host tissues, but able to resume development when elimination of the adult worm population removes the premune check on their growth. In addition to mechanisms resulting in the protection of the host, other immune phenomena occur, such as the stimulation of blood group antibodies. Natural resistance to helminthic infection and the means by which helminths protect themselves from their hosts are briefly discussed. J.M.W.

313—Vic et Milieu. Paris.

- a. DOLLFUS, R. P. & SAINT GIRONS, M. C., 1958.—“Modification du comportement d'un *Apodemus* parasité par des cystiques polycéphales, en relation avec la croissance de ceux-ci.” 9 (1), 116-123.

(313a) Dollfus & Saint Girons found eight polyccephalic cysts in the abdominal cavity of an *Apodemus flavicollis flavicollis* from Banyuls-sur-Mer. Each head bore 36 hooks in two rows; the 18 larger hooks measuring 320μ to 325μ and the 18 smaller hooks measuring 220μ to 222μ . They are considered to be teratological forms of *Cysticercus fasciolaris*. I.L.O.

314—Yokohama Medical Bulletin.

- a. ISHII, Y., 1958.—“Fundamental studies of the chemicals against ascarids.” 9 (5), 283–289.
- b. OMORI, N., 1958.—“Experimental studies on the role of the house mosquito, *Culex pipiens pallens* in the transmission of bancroftian filariasis. 3. Duration of life of filariae in mosquitoes exposed to winter temperatures.” 9 (6), 382–390.

(314a) Male ascarids from pigs were used to assess drug activity *in vitro*. The worms were maintained in 0.9% saline at 30°C. and the chemicals under test were used at concentrations of 1:1,000. The time of onset of immobility after introduction of the drug was used as the criterion of drug effect. Eight groups of chemical substances, each with several variations in substitution in the ring were examined in this way. Phenols: phenol was inactive while thiophenol was active; -chloro substitution confirmed greater activity in the *p*-position than in the *o*-position. Increase in the number of chlorine atoms to three or five reduced activity. Cresols: a relatively inactive group except for carvacrol; *p*-chlorocarvacrol was more active than carvacrol itself; *p*-chloro-*m*-cresol and thymol were the most active in this group. Benzoic acids: inactive compounds but some activity was observed where the hydroxyl group was replaced by thiol. Benzaldehydes: the activity of benzaldehyde was increased by substitution with hydroxyl *ortho* to the aldehyde group. Hydroquinones: hydroquinone was inactive but replacement of both hydroxyl groups by thiols conferred moderate activity; inclusion of a thiol group in the hydroquinone ring increased activity. Resorcinols: The slight activity of resorcinol was much increased by *n*-alkyl substitution to form hexylresorcinol; addition of a chlorine to hexylresorcinol reduced toxicity while retaining activity; alkyl chain lengths of less or more than five carbon atoms decreased activity. Naphthols: α -naphthol was more active than β -naphthol; activity of β -naphthol was increased by mono-chloro substitution but was decreased by di- and tri- chloro substitution. Naphthoquinones: naphthoquinone and its analogues showed no activity. O.D.S.

(314b) *Culex pipiens pallens* infected with microfilariae of *Wuchereria bancrofti* were kept in winter time in a laboratory and in a colder passage outside the laboratory where the temperatures fluctuated considerably but were always a few degrees above the temperature outdoors. In control batches of infected mosquitoes kept at 25°C. and 27°C. the larval filariae developed normally. In batches of mosquitoes which were subjected to the lower temperatures immediately after their infective blood-meal, the larvae did not reach the second stage of development; in batches subjected to the lower temperatures when the larvae had developed to the second stage, the larvae did not reach the third stage. Other batches of mosquitoes were not subjected to the lower temperatures until they had reached the third stage. The larvae did not survive as long as the mosquitoes and it was concluded that *W. bancrofti* could not survive the winter in hibernating mosquitoes and that the infection, therefore, could not be carried over from one year to the next by the mosquitoes. It was also concluded that second-stage larvae were least resistant to low temperatures and third-stage larvae were most resistant.

W.A.F.W.

315—Zeitschrift für Parasitenkunde.

- a. GOIL, M. M., 1958.—“Rate of oxygen consumption in trematode parasites.” 18 (5), 435–440.
- b. FAROOQI, H. U., 1958.—“A new species of the genus *Pallisentis* from a fresh-water eel.” 18 (6), 457–464.
- c. FAROOQI, H. U., 1958.—“*Orchipedum leanderi* n.sp. (family Orchipidae), developing neotenually in a fresh-water shrimp.” 18 (6), 465–469.
- d. PFEIFFER, H., 1958.—“*Raillietina (Skrjabinia) böhmii* nov.spec., ein neuer Bandwurm von Haushuhn.” 18 (6), 470–478.
- e. OSCHKE, G., 1958.—“Beiträge zur Morphologie, Ökologie und Phylogenie der Ascaridoidea (Nematoda). Parallelen in der Evolution von Parasit und Wirt.” 18 (6), 479–572.

(315a) Goil has studied the rates of oxygen consumption in *Paramphistomum explanatum* (from the bile-ducts) and *Gastrothylax crumenifer* (from the reticulum) of buffaloes. His results are analysed statistically. With *P. explanatum* the rate of consumption was significantly

different between samples and between 15-minute periods; the mean rate of Q_{O_2} based on all 36 observations was -0.983 ± 0.052 cu. mm. per mg. dry weight of parasite per hour. With *G. crumenifer* there was no significant difference between samples but there was between 15-minute periods; the mean rate in this trematode was -0.319 ± 0.039 cu. mm. per mg. dry weight of parasite per hour. The influence of age, motility and habitat are discussed. S.W.

(315b) Farooqi describes and figures a new acanthocephalan species—*Pallisentis basiri* n.sp.—from the fresh-water eel *Rhynchobdella aculeata* collected in the Aligarh District of India. The new species differs from seven of the eight previously known species in that Säftigen's pouch is present, and from the remaining species—*P. gaboes*—in having pre-equatorial testes, lemnisci reaching the anterior border of the testis, and trunk spination extending back as far as the cement gland. A key to seven species of the genus is given. The remaining species—*P. allahabadi*—recently described by Agarwal (1958) from *Ophicephalus punctatus* [see abstract No. 226a above] is not included in the key but is referred to in the text. J.M.W.

(315c) A description is given of *Orchipedium leanderi* n.sp., an unencysted neotenic metacercaria, found attached by its ventral sucker to the tergal epithelium in *Leander fluminicola* from Aligarh (India). The body is broad anteriorly and narrow posteriorly. It lacks an oesophagus, but possesses a receptaculum seminis, a genital pore just behind the intestinal bifurcation, about 165 testes in two lateral fields and extra-caecal vitellaria composed of small follicles extending from behind the ovary to the posterior level of the testes. All adult characters are present except a fully developed uterus with eggs. No vertebrate final host has been found for this species. B.L.J.

(315d) Pfeiffer describes and figures *Raillietina (Skrjabinia) böhmi* n.sp. from the small intestine of domestic fowls in the Vienna district. The new species is distinguished from *R. (S.) cesticillus*, the only other member of the subgenus reported for this host, by the larger size and smaller number of the rostellar hooks and by the larger number of testes. A key to 12 species of *R. (Skrjabinia)* is included. A.E.F.

316—Zeitschrift für Pflanzenkrankheiten (Pflanzenpathologie) und Pflanzenschutz.

- a. KÜHN, H., 1958.—“Über die Abwehrnekrose eines Kartoffelbastardes gegen den Kartoffelnematoden (*Heterodera rostochiensis* Wr. in *Solanum tuberosum* subsp. *andigena* (Juz. et Buk.) Hwk. x *Solanum tuberosum* L.).” 65 (8), 465–472.
- b. GOFFART, H., 1958.—“Anbauversuche mit ‘Heertvelder’—Roggen zur Bekämpfung der Stockkrankheit des Roggens.” 65 (11), 657–660.

(316a) Root diffusate from a potato hybrid (*Solanum tuberosum* subsp. *andigena* × *S. tuberosum*) stimulates hatching of the potato-root eelworm, *Heterodera rostochiensis*, and the larvae invade the roots but they do not mature. Kühn shows that the cells which form galls in susceptible plants become necrotic in the resistant hybrid. It is suggested that the nematode is dependent on these particular cells for nutrition and that the presence of a necrogenic factor in the hybrid depriving the nematode of a source of food is the basis of resistance. H.R.W.

(316b) The rye “Heertvelder” showed clear resistance in the field and in pots against three populations of *Ditylenchus dipsaci* and gave higher yields than “Petkuser”, although on clean soils it yielded 15% to 20% lower than “Petkuser”. J.B.G.

317—Zeitschrift für Tropenmedizin und Parasitologie.

- a. LÄMMLER, G., 1958.—“Beiträge zur experimentellen Schistosomiasis. I. Mitteilung. Untersuchungen zur Chemoprophylaxe der Bilharziose.” 9 (4), 294–310. [English summary p. 309.]
- b. BUCK, A. A., SADUN, E. H., LIESKE, H. & LEE, B. K., 1958.—“Zur Chloroquinetherapie der Paragonimiasis.” 9 (4), 310–327. [English summary pp. 326–327.]
- c. BUCK, A. A., SADUN, E. H., LIESKE, H., LEE, B. K. & HAAGE, H., 1958.—“Zur Differentialdiagnose von Lungentuberkulose und Paragonimiasis durch die Einbeziehung immundiagnostischer Methoden.” 9 (4), 328–334. [English summary p. 334.]

- d. MINNING, W., NEWSOME, J. & ROBINSON, D. L. H., 1958.—“Trematoden-Stoffwechselprodukte als Antigene.” 9 (4), 335-342. [English summary pp. 341-342.]

(317a) Lämmler has tested on mice three compounds for their efficacy in preventing *Schistosoma mansoni* infection. S 616 (4-chloro-2-[β -diethylamino-ethylamino]-1,3,5-trimethyl-benzol hydrochloride) and S 688 (maleic acid-mono-4-[3'-chloro-4'-methyl-phenyl] piperazide), both effective therapeutically, will also affect immature worms: S 616 kills the worms during the migration in the skin capillaries. S 688 was ineffective against experimental schistosomiasis from the 12th to the 18th day after infection. When applied as a repellent to the tails of mice S 390 (4-chloro-2-[β -ethylamino-ethylamino]-1,3,5-trimethyl-benzol hydrochloride) prevents penetration of cercariae for four to six hours. A.E.F.

(317b) Buck *et al.* report on the treatment of a series of 116 paragonimiasis patients with the chloroquine diphosphate preparation Resochin. The daily dose was 0.75 gm. for adults and 0.5 gm. for children, and was given by mouth, intramuscularly, intrapleurally, or by inhalation. A therapeutic effect (judged by egg count) appeared when from 5 to 40 gm. Resochin had been given: if no result was apparent after 40 gm. a higher total dosage had no effect. Although only 12.5% of the patients remained free from infection six months after treatment Resochin is considered to be of value in the treatment of recent infections. A.E.F.

(317c) Buck *et al.* gave skin tests, using purified antigens of *Paragonimus westermani* and of *Clonorchis sinensis*, to 128 patients being treated for pulmonary tuberculosis and to 102 patients whose lung X-rays were normal. With the *Clonorchis* antigen the percentage of positive reactors was about the same in both groups, but ten of the tuberculosis and only one of the non-tuberculosis patients were positive to *Paragonimus* antigen. *Paragonimus* ova were found in the sputum of five of those positive to *Paragonimus* antigen: in two of these cases the diagnosis of tuberculosis had been wrong while the remaining three were found to have pulmonary tuberculosis as well as paragonimiasis. A.E.F.

(317d) Minning *et al.* report that metabolic products of *Schistosoma mansoni* and *Fasciola hepatica* kept in culture media have been used as antigens in the complement fixation test. Further investigation is necessary to determine whether the *S. mansoni* antigen is species-specific. The *F. hepatica* metabolic products gave clear results with human sera and sera from experimentally infected rabbits; there was no group reaction with sera from human beings infected with *Schistosoma*. A.E.F.

318—Zeitschrift für Zellforschung und Mikroskopische Anatomie.

- a. ÁBRAHÁM, A. & MINKER, E., 1958.—“Über die Innervation des Darmkanales des medizinischen Blutegels (*Hirudo medicinalis* L.).” 47 (4), 367-391.

(318a) Ábrahám & Minker describe in detail the structure and arrangement of the nerve elements in the wall of the alimentary canal of the medicinal leech, *Hirudo medicinalis*, basing their work on specimens prepared by a modification of Bielschowsky's impregnation method. The paper, which does not lend itself to further abstraction, includes a comparative anatomical discussion and is illustrated by 15 clear and excellent photomicrographs. J.M.W.

319—Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene. Abteilung 1. Originale.

- a. EMANUILOFF, I., 1958.—“Untersuchung der Wechselbeziehungen zwischen Bakterien und Ascariden in der Darmparasitose bei Schweinen und Pferden.” 172 (1/2), 113-126. [English, French, Spanish & Russian summaries pp. 125-126.]
- b. KOZAR, Z., KOLLOTO, B. & WARDA, L., 1958.—“Untersuchungen über die Trichinellose mittels des Intradermaltestes. I. Bewertung des Intradermaltestes bei frischen und älteren Infektionen.” 172 (1/2), 164-174. [English, French, Spanish & Russian summaries pp. 172-173.]
- c. KOZAR, Z., KOLLOTO, B. & WARDA, L., 1958.—“Untersuchungen über die Trichinellose mittels des Intradermaltestes. II. Epidemiologische Untersuchungen im Gebiete von Bialystok.” 172 (1/2), 175-183. [English, French, Spanish & Russian summaries pp. 182-183.]

- d. BÖHM, L. K. & SUPPERER, R., 1958.—“Beiträge zur Kenntnis tierischer Parasiten III.” 172 (3/4), 298–309.

(319a) Emanuiloff has studied the relationships between bacteria and ascarids from pig and horse. Between intestinal bacteria of the *Escherichia coli*, *Pseudomonas* and *Proteus* groups and ascarids, reactions of a symbiotic character have been demonstrated. The antibiotic substances of *Pseudomonas* and the “coelomic” fluid of ascarids inhibit the growth of a number of gram-positive bacteria and also of *Bacterium alcaligenes*. The proteolytic enzyme from *Bact. mesentericus* can kill ascarids *in vitro*. A.E.F.

(319b) Kozar *et al.* report on the use of the intradermal test in the diagnosis of trichinelliasis. In one series of 180 known cases, examined 7 to 28 days after onset of illness, the reaction was positive in 129 (71.6%). In a second series 99 healthy persons, who had had infections (varying from sub-clinical to severe) 6 months to 20 years before, were tested and 75 (75.6%) were positive. These results show that the test is sensitive and specific and will give a positive result ten years or longer after infection. It thus makes it possible to detect old infections and also to estimate the time which has elapsed since the onset of infection. A.E.F.

(319c) Kozar *et al.* have examined a total of 2,472 persons from 28 localities in the Białystok region (north-east Poland) for *Trichinella* infection by means of the intradermal test: 938 (37.94%) were positive. Variations between 2% and 100% infection were found in different localities. This high incidence was confirmed when 344 post-mortems revealed a 15% infection. There appeared to be no correlation between incidence and the sex, age, occupation or social position of those examined. The incidence in pigs slaughtered throughout the region was 0.226%. Domestic animals are thought to be a more dangerous source of infection than wild ones although pigs are not considered to be the only source of human infection. A.E.F.

(319d) Böhm & Supperer present a series of ten notes on animal parasites of which the following are of helminthological interest. (i) The question of the possible identity of *Prosthogonimus pellucidus* and *P. longus* must be left open: the differences cannot be said definitely to fall within the normal range of variation within a single species. (ii) *Ophiosoma zedli* is reported for the first time from Austria: it was found in *Botaurus stellaris* from the Neusiedler See. (iii) A massive infection with *Progamotaenia diaphana* was discovered at post-mortem in a wombat, *Phascolomys ursinus*, which died in a Vienna Zoo: the morphology of this species is discussed. (iv) Some observations on ova of Anoplocephalidae, with special reference to the “pear-shaped apparatus” and its morphology are presented. (v) A revised description of *Ancylostoma pluridentatum*, from a tiger which died in a Vienna Zoo, is illustrated by a figure of the bursa. (vi) Further studies on the life history of *Porrocaecum ensicaudatum* have shown *Allolobophora caliginosa* to be a natural intermediary and *Turdus merula* a natural definitive host. A.E.F.

320—Zentralblatt für Veterinärmedizin.

- a. SCHAAF, J. & LAMPE, B., 1958.—“Zur Biologie der Trichinelle.” 5 (2), 135–151. [English, French & Spanish summaries pp. 148–150.]
- b. WETZEL, R., KERSTEN, W. & EDER, H., 1958.—“Prophylaktische Wirkung von Piperazinhydrochlorid und Vitamin-A-Stoffwechsel beim Spulwurmbefall (*Ascaridia galli*) der Küken.” 5 (4), 357–366. [English, French & Spanish summaries pp. 364–365.]
- c. MAHMOUD, A. H., FAHMY, M. A. M. & SELIM, M. K., 1958.—“Preliminary experiments on the effect of piperazine adipate (Nometane) on infections with *Ascaridia galli* and *Toxocara canis* in Egypt.” 5 (4), 366–372. [French, German & Spanish summaries pp. 371–372.]

(320a) The biology of *Trichinella* was investigated by feeding experiments on laboratory animals especially hamsters. Free worms were found in the intestine eight hours after feeding infected meat. These became sexually mature within two days, copulation occurring in from two to three-and-a-half days. Embryos could be recognized in the uterus in four-and-a-half days and free motile young worms in the intestine in seven-and-a-half days, but adult worms

were still present there until the 33rd day after infection. Midway through the ninth day free motile young worms could be squeezed out of muscle preparations but invasive forms were not found until the 19th day after infection. By the 30th day almost all the larvae were in the coiled-up form. All were encapsulated by the 60th day but even 14 months after feeding no calcification could be detected. After two infections hamsters showed considerable resistance to a third infection.

W.K.D.

(320b) Piperazine hydrochloride was tested for prophylactic value in groups of leghorn chicks experimentally infected with *Ascaridia galli* and observation was made on the metabolism of vitamin A in infected and uninfected birds given drug treatment. All birds in the infected groups were given 600 embryonated eggs of *A. galli*; the drug was given at the time of infection and was continued for four weeks. Drug administration was carried out by addition to the food in proportions of 0.1%, 0.2% and 0.3%. Complete protection against infection was provided by the 0.2% and 0.3% levels while a marked prophylactic effect was obtained at 0.1%. Parasitism with *A. galli* caused a marked fall in the vitamin A level of the liver, as compared with unparasitized chicks; vitamin A levels in treated parasitized chicks were higher than in untreated uninfected controls; the highest vitamin A levels were found in piperazine-treated uninfected controls. It is believed that the drug exerts its anthelmintic effect when the larvae are in the lumen of the gut.

O.D.S.

(320c) Mahmoud *et al.* have tested Nometane (piperazine adipate) against *Ascaridia galli* in fowls and *Toxocara canis* in dogs and found it to be safe and effective. The most satisfactory dose regimen for the chickens was found to be 100 mg. per kg. body-weight given in the feed followed, one week later, by 200 mg. per kg. Dogs were given 200 mg. or 300 mg. per kg. after 12 hours' fasting. *Taenia* sp. and *Dipylidium caninum* were not affected.

S.W.

321—Zoologicheski Zhurnal.

- a. MOLEV, E. V., 1958.—[The culture of black-flies of the genus *Culicoides* under laboratory conditions.] **37** (10), 1563–1568. [In Russian: English summary p. 1568.]
- b. LUKIN, E. I., 1958.—[On the classification of leeches.] **37** (11), 1740–1741. [In Russian: English summary p. 1741.]
- c. MARKOVA, T. G., 1958.—[Seasonal changes in the parasite fauna of pike in the Oka river.] **37** (12), 1801–1807. [In Russian: English summary p. 1807.]
- d. GORYACHEV, P. P., 1958.—[The influence of the level of river flooding on the development of the carriers of opisthorchiasis.] **37** (12), 1808–1812. [In Russian: English summary pp. 1811–1812.]

(321b) Lukin briefly reviews Livanov's (1905) work on the morphology of *Acanthobdella peledina*. The classification of the Hirudinea he represents as falling naturally into two sub-classes, the Archihirudinea containing the only genus *Acanthobdella*, and the Euhirudinea with the orders Rhynchobdellea and Arhynchobdellea (Gnathobdellea). The sub-division of orders into families is under revision.

G.I.P.

(321c) Markova has studied the specific and quantitative composition of the parasites of 197 pike in the river Oka. The helminths *Azygia lucii*, *Phyllodistomum folium*, *Bucephalus polymorphus*, *Triaenophorus nodulosus* and *Acanthocephalus lucii* were present throughout the year, *Tetraonchus monenteron*, *Diplostomulum spathaceum* and *Raphidascaris acus* for varying parts of the year (all including the spring to autumn period) while others were less frequent. The highest infections were observed from winter to early summer.

G.I.P.

(321d) Flooding of the rivers Irtys and Om in rainy seasons favours the spread and development of *Opisthorchis felineus*. The overflowing river water carries parasite eggs from the river bottom and the surrounding marshy area to nearby ponds where *Bithynia leachi* is present. At the same time young ide, dace and bream travel from the river to the shallow ponds where they come in close contact with the infected snails and are easily available to various mammalian hosts. In dry years, e.g. 1951, the ponds were disconnected from the river or dried out altogether and fish caught in the river remained uninfected as compared with 12% infected in wet years.

G.I.P.

NON-PERIODICAL LITERATURE

- 322—AGUILAR, M. B. G. M., 1958.—“Estudio sobre algunos nemátodos de mamíferos.” Thesis, Mexico, 89 pp.

Aguilar describes and figures 11 species of nematodes, thus: *Strongylus (Delafondia) vulgaris* (Looss, 1900) and *Triodontophorus serratus* (Looss, 1900), both from *Equus caballus*, Zoological Park, Chapultepec; *Oesophagostomum (Oesophagostomum) dentatum* (Rudolphi, 1803), ex *Pecari tajacu crassus*, locality unknown; *Murshidia murshidia* Lane, 1914, ex *Elephas maximus*, Zoological Park, Chapultepec; *Obeliscoides cuniculi* (Graybill, 1923), ex *Sylvilagus floridanus orizabae*; *Longistrata [lapsus pro Longistriata] dubia* (Travassos, 1921), ex *Romerolagus diazi*; *Dermatoxys veligera* (Rudolphi, 1819), ex *R. diazi*; *Passalurus nonanulatus* Skinker, 1931, ex *R. diazi* (the last four species all from Cerro Pelado, D.F.); *Physaloptera maxillaris* Molin, 1860, ex *Urocyon cinereoargenteus colimensis*, Guerrero, Gro.; *Physaloptera torresi* (Travassos, 1920), ex *Didelphis marsupialis californica*, Dominguillo, Oax. W.G.I.

- 323—BLACKLOCK, D. B. & SOUTHWELL, T., 1958.—“A guide to human parasitology for medical practitioners.” London: H. K. Lewis & Co. Ltd., 6th edit. (revised by T. H. Davey viii + 222 pp.

In the helminthological sections of the sixth edition of this classic text, again revised by Professor T. H. Davey, are incorporated only the minor alterations necessary to bring it into line with modern thought. Additions include: a section on the quantitative estimation of hookworm eggs by Stoll's dilution techniques; a key to the species of intestinal nematodes parasitic in man; and a note on the distribution of *Taenia saginata* eggs in sewage effluent and through the agency of seagulls feeding on sewage. The original comment on the physiological distinctness of *Ascaris lumbricoides* in the pig and in man has been omitted. The original synopsis of theories of microfilarial periodicity has been replaced by the statements that “during their absence from the peripheral circulation, the microfilariae are believed to be accommodated in a visceral reservoir, probably the lungs” and that “the stimulus causing the periodic migration to and from the visceral reservoir has not yet been elucidated”. The existence of reservoir hosts of *Wuchereria malayi* is acknowledged. The life-cycle diagrams at the end of the book have been re-grouped according to the method of infection of the definitive host in place of the previous taxonomic arrangement. Chapter XXII on Congenital Infection, Immunity and Post-Mortem Examination has been omitted. J.M.W.

- 324—DOGEL, V. A., PETRUSHEVSKI, G. K. & POLYANSKI, Y. I. [Editors], 1958.—[Basic problems of the parasitology of fishes.] Leningrad: Izdatelstvo Leningradskogo Universiteta, 364 pp. [In Russian.]

- a. DOGEL, V. A., 1958.—[Parasite fauna and the surrounding medium. Some questions in the ecology of parasites of fresh-water fish.] pp. 9–54. [German summary pp. 336–337.]
- b. POLYANSKI, Y. I., 1958.—[Parasite fauna and the surrounding medium. Some questions in the ecology of parasites of marine fish.] pp. 55–89. [German summary pp. 337–338.]
- c. BAUER, O. N., 1958.—[Relationships between the parasite and the host (fish).] pp. 90–108. [German summary p. 338.]
- d. SHULMAN, S. S., 1958.—[Specificity of fish parasites.] pp. 109–121. [German summary pp. 338–339.]
- e. MARKOV, G. S., 1958.—[The physiology of fish parasites.] pp. 122–143. [German summary p. 339.]
- f. GINETSINSKAYA, T. A., 1958.—[Life-cycles and biology of the larval stages of parasitic worms of fish.] pp. 144–183. [German summary pp. 339–340.]
- g. SHULMAN, S. S., 1958.—[Zoogeographical analysis of the parasite fauna of fresh-water fish in the U.S.S.R.] pp. 184–230. [German summary p. 340.]
- h. POLYANSKI, Y. I., 1958.—[Zoogeographical characterization of the parasite fauna of marine fish in the U.S.S.R.] pp. 231–246. [German summary p. 340.]
- i. BAUER, O. N. & STOLYAROV, V. P., 1958.—[The formation of the parasite fauna and parasitic diseases of fish in water reservoirs.] pp. 247–255. [German summary p. 340.]
- j. PETRUSHEVSKI, G. K., 1958.—[Changes in the parasite fauna of fish on their acclimatization.] pp. 256–266. [German summary p. 340.]

- k. BAUER, O. N., 1958.—[Parasitic diseases of fish in fish-breeding farms and fish nurseries and their control.] pp. 267–300. [German summary p. 341.]
- l. PETRUSHEVSKI, G. K. & SHULMAN, S. S., 1958.—[Parasitic diseases of fish in water reservoirs in the U.S.S.R.] pp. 301–320. [German summary p. 341.]
- m. BAUER, O. N., 1958.—[Fish as the source of helminth infections of man.] pp. 321–335. [German summary p. 341.]

(324a) Dogel discusses, giving examples, the dependence of the parasite fauna of fresh-water fishes on changes in the medium surrounding the host and on the physiological condition of the host. The various factors dealt with under separate headings are: the size, degree of isolation and chemical composition of the water reservoir; geographical localization; the occurrence of the host on the border of the distribution area; annual climatic changes; the season of the year; the morphological and physiological character of the host; its age, food, migration and hibernation; the depth at which the host is found; host abundance; relict existence of the host (e.g. Cottoidei in the Ladoga, Onega and Baykal lakes); and interspecific relationships between parasites. G.I.P.

(324b) Polyanski discusses some factors in the ecology of parasites of marine fish. The parasite fauna is influenced by the salt content of the water, the depth at which the host is found and by its age (which plays a somewhat different role than in fresh-water fish), food and migration period. Examples are chiefly drawn from Russian literature. The author concludes with a short review of the life-cycles of parasites of marine fish and some general remarks on the ecology of the parasites of marine animals. G.I.P.

(324c) Parasites of fish can harm their hosts by (i) causing mechanical injury, such as irritation, injury or atrophy of tissues and occlusion of the gut or blood vessels, (ii) introducing toxic metabolic by-products able to produce changes in the blood and hormone activity of the host, (iii) depriving them of food, as in the case of very large or very numerous intestinal worms, and (iv) acting as vectors of other pathogens. The host reaction can be expressed in tissue proliferation, degeneration and inflammation, and the development of immunity. Discussing these reactions, Bauer gives numerous examples. G.I.P.

(324d) Shulman follows some general remarks on host specificity with examples of the specificity of a parasite to a single fish species, a genus, a systematic group and a phylogenetically compact complex. The host specificity of a parasite depends chiefly on close contact with the host, on its physiological and ecological characteristics, on the presence of adaptations in the parasite, on the constancy of conditions in the medium and of the food of the parasite and on the antiquity of that host-parasite relationship. There is no fundamental difference between relative and so-called absolute host specificity, the difference being one of degree. In the course of evolution, specificity can change in one direction or another under the influence of various ecological and physiological factors. G.I.P.

(324e) From Russian and other literature, Markov presents a picture of the physiology of parasites, particularly of the helminths of fish. He recounts data on the relationship between the parasite and its medium, the feeding of parasites, types of metabolic processes, and the molecular concentration and osmotic relationships of the medium. A short paragraph on laboratory culture of parasitic worms and on their development in the host is included. G.I.P.

(324f) Ginetsinskaya discusses, giving examples, the various morphological and physiological adaptations found in helminths which facilitate infection of the hosts. She reviews data on the life-cycles of helminths of fish (separately for trematodes, cestodes, nematodes and acanthocephalans) and concludes with an extensive list of the intermediate and final hosts of species parasitizing fresh-water and marine fish in the U.S.S.R. G.I.P.

(324g) The zoogeographical distribution of fish parasites basically coincides with that of the hosts and fully agrees with the division into regions proposed by Berg in 1949 (whose map is here reproduced). The greatest part of Russian waters falls within the Holarctic

region, only a small area in the Far East belonging to the Amur region. A detailed review of the geographical distribution of parasites of fresh-water fish is given and zoogeographical data are tabulated for all the parasitic species known from these fish in the U.S.S.R. G.I.P.

(324h) In this paper, Polyanski undertakes a zoogeographical analysis of the parasites of marine fish of the U.S.S.R. and presents examples of the use of parasitological data in the zoogeographical study of seas. G.I.P.

(324i) When a river is dammed to form a lake the original parasite fauna of the fish undergoes a change which lasts up to ten or more years. The character of the change varies with the parasite group and is conditioned by changes in the host fauna and in the hydrological character of the reservoir. For most parasites with a complex life-cycle an initial marked fall in numbers (lasting one to two years in most cestodes and four to five years in trematodes) is subsequently followed by an increase. The geographical position of the reservoir, in conjunction with changes in temperature, plays a decisive role in the formation of the parasite fauna, by encouraging warmth- or cold-loving fish species. In large reservoirs the parasite fauna is not uniform, retaining a river character in surface sections and meanders. G.I.P.

(324j) Petrushevski quotes numerous examples from Russian literature showing that when fish become acclimatized in new water reservoirs where related species are absent, their parasite fauna becomes poor, particularly if they are parasite-free when introduced. New parasites are acquired from related hosts or, when these are absent, acquired species are non-specific. All the known data from the U.S.S.R. on the acclimatization of fish, with reference to the number of original parasite species and the number and names of parasites harboured in the new reservoir are tabulated. G.I.P.

(324k) Bauer stresses the importance, with reference to development of parasitic diseases in fish-breeding farms, of the following factors: overcrowding with one species; low resistance of fish during the winter; structure of the reservoirs; isolation of different stages of the fish; and adherence to control measures. He discusses in detail various infections, including helminths and leeches, for common carp and trout (the fish principally bred in Russia), Crucian carp, other Salmonidae, tench, a variety of ide and sturgeon. G.I.P.

(324l) Among the parasites reviewed for their epizootiological significance in fish-breeding reservoirs are species of a number of helminth genera, viz., *Dactylogyrus*, *Gyrodactylus*, *Nitzschia*, *Diplostomulum*, *Posthodiplostomum*, *Tetracotyle*, *Triaenophorus*, *Cyathocephalus*, *Raphidascaris* and *Echinorhynchus*. G.I.P.

(324m) Bauer writes on the distribution in the U.S.S.R. of such larval parasites of fish pathogenic to man as species of *Diphyllbothrium*, *Opisthorchis felineus*, *Clonorchis sinensis*, *Metorchis albidus*, *Pseudamphistomum truncatum* and *Metagonimus yokogawai*. These parasites tend to form centres of infection. The chief focus of opisthorchiasis is in cyprinid fish, in the basin of the Ob and Irtysh, and of *D. latum* in north-western Russia around Leningrad, the principal hosts being the pike, burbot, perch and ruff. In Siberia diphyllbothriasis is due to *D. minus* and *D. strictum*. G.I.P.

325—EUZÉBY, J., 1958.—“Diagnostic expérimental des helminthoses animales. Travaux pratiques d'helminthologie vétérinaire.” Paris: Vigot Frères, 367 pp.

In his introduction Euzéby emphasizes the frequency, not only of the asymptomatic carrier state in helminthic infections of domestic animals, but also of essentially similar clinical syndromes due to different species of parasitic worms. His book, which is of an essentially practical nature, is specifically designed to assist in the elucidation of such problems. It is addressed to veterinary practitioners, students of veterinary medicine, and all medical and veterinary laboratory workers. A brief systematic review of the principal groups of parasitic worms, among which are included the linguatulids, precedes the main part of the work, which is divided into three sections. The first deals with direct methods of experimental diagnosis,

and includes a detailed consideration of methods of faecal examination both in general and with respect to all the principal kinds of domestic animals in particular; urological examination; haematological examination; dermatoscopic examination; and the collection and identification of parasitic worms from the various organs and tissues of the body at autopsy. The second section deals with xenodiagnosis, with special reference to habronemiasis of equines, trichinellosis and filariasis. The third section deals with indirect diagnostic methods and is mainly concerned with immunological techniques, the place of which in the general scheme of diagnostic work is discussed. Numerous clear photographs and line drawings illustrate the text. A particularly valuable feature is the inclusion of an excellent series of keys for the identification of the helminth eggs found in the faeces of each species of domestic animal. This book should find a place on the shelves of every helminthological laboratory. J.M.W.

- 326—GVOZDEV, E. V., 1958.—[Parasitic worms of galliform birds in Kazakhstan.] Alma-Ata: Izdatelstvo Akademii Nauk Kazakhskoi SSR., 265 pp. [In Russian.]

In this monograph, Gvozdev has gathered together data, from his own investigations (distributed over eight years) and from the literature, on the helminth fauna of domestic and wild Galliformes in Kazakhstan. 28 species of trematodes, 25 species of cestodes, 34 species of nematodes and two species of acanthocephalans are listed for Kazakhstan and its vicinity. Of these species 24 trematodes, 23 cestodes, 29 nematodes and one acanthocephalan have actually been found in Kazakhstan, but the others are likely to occur. The author gives descriptions for most of these species and includes 82 figures, most of which are original. Maps show the area of occurrence of these helminths in the State. The author discusses the trematode, cestode and nematode fauna of these birds in general and separately for domestic fowls and turkeys and for ten wild species. He considers the role played by wild Galliformes in spreading infections to domestic birds. The monograph includes a comprehensive list of literature on the helminth fauna of Galliformes in the U.S.S.R. G.I.P.

- 327—INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE, 1958.—“Official list of family-group names in zoology. First instalment: Names 1-236.” London: International Trust for Zoological Nomenclature, xviii+38 pp.

In this first instalment of the “Official list of family-group names in zoology” the following nematode families or sub-families are dealt with: Dracunculidae Stiles, 1907 (type genus *Dracunculus* Reichard, 1759); Oesophagostominae (correction by Railliet, 1915 of Oesophagostomeae) Railliet & Henry, 1909 (type genus *Oesophagostomum* Molin, 1861); Stephanuridae (correction by Railliet, Henry & Bauche, 1919 of Stephnurida) Molin, 1861 (type genus *Stephanurus* Diesing, 1839); Tylenchidae Örley, 1880 (type genus *Tylenchus* Bastian, 1865). S.W.

- 328—INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE, 1958.—“Official index of rejected and invalid family-group names in zoology. First instalment: Names 1-273.” London: International Trust for Zoological Nomenclature, xii+38 pp.

- 329—INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE, 1958.—“Official list of generic names in zoology. First instalment: Names 1-1274.” London: International Trust for Zoological Nomenclature, xxxvi+200 pp.

The following helminths are included in the first instalment of the “Official list of generic names in zoology”: *Gigantorhynchus* Hamann, 1892 (Acanthocephala); *Davainea* Blanchard & Railliet, 1891, *Dipylidium* Leuckart, 1863, *Ligula* Bloch, 1782, *Moniezia* Blanchard, 1891, *Stilesia* Stiles & Hassall, 1893, *Taenia* Linnaeus, 1758, *Thysanosoma* Diesing, 1835 (Cestoda); *Haemadipsa* Tennent, 1859, *Hirudo* Linnaeus, 1758, *Limmatis* Moquin-Tandon, 1827 (Hirudinea); *Ancylostoma* (emend. of *Agchylostoma*) Dubini, 1843, *Anguina* Scopoli, 1777, *Ascaris* Linnaeus, 1758, *Dracunculus* Reichard, 1759, *Filaria* Müller (O.F.), 1787, *Gnathostoma* Owen, [1837], *Heterodera* Schmidt, 1871, *Necator* Stiles, 1903, *Oesophagostomum* Molin, 1861,

Stephanurus Diesing, 1839, *Strongyloides* Grassi, 1879, *Strongylus* Müller (O.F.), 1780, *Syngamus* Siebold, 1836, *Trichostrongylus* Looss, 1905, *Tylenchus* Bastian, 1865 (Nematoda); *Gordius* Linnaeus, 1758, *Paragordius* Camerano, 1897 (Nematomorpha); *Dicrocoelium* Dujardin, [1844], *Fasciola* Linnaeus, 1758, *Gastrodiscus* Cobbold, 1877, *Hemiurus* Rudolphi, 1809, *Heterophyes* Cobbold, 1866, *Schistosoma* Weinland, 1858 (Trematoda). A number of names originally included were found to have serious defects and are now omitted; these are listed in an annexe to the minute by the Secretary dated 9th February, 1958 and include *Anoplocephala* Blanchard, 1848, *Hymenolepis* Weinland, 1858, *Echinococcus* Rudolphi, 1801 and *Rhabditis* Dujardin, [1844]. S.W.

330—INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE, 1958.—
“Official index of rejected and invalid generic names in zoology. First instalment: Names 1-1169.” London: International Trust for Zoological Nomenclature, xii+132 pp.

331—INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE, 1958.—
“Official list of specific names in zoology. First instalment: Names 1-1525.” London: International Trust for Zoological Nomenclature, xvi+206 pp.

This first instalment of the “Official list of specific names in zoology” includes the following helminths: *echinodiscus* (*Echinorhynchus*, Diesing, 1851, now specific name of type species of *Gigantorhynchus* Hamann, 1892) (Acanthocephala); *actinoides* (*Thysanosoma*, Diesing, 1835, specific name of type species), *avium* (*Ligula*, Bloch, 1782), *canina* (*Taenia*, Linnaeus, 1758, now specific name of type species of *Dipylidium*), *expansa* (*Taenia*, Rudolphi, 1805, now specific name of type species of *Moniezia* Blanchard, 1891), *globipunctata* (*Taenia*, Rivolta, 1874, now specific name of type species of *Silesia* Stiles & Hassall, 1893), *intestinalis* (*Fasciola*, Linnaeus, 1758), *proglottina* (*Taenia*, Davaine, 1860, now specific name of type species of *Davainea* Blanchard & Railliet, 1891), *solium* (*Taenia*, Linnaeus, 1758, specific name of type species) (Cestoda); *ceylanica* (*Hirudo*, Blainville, [June] 1827, now specific name of type species of *Haemadipsa* Tennent, 1859), *medicinalis* (*Hirudo*, Linnaeus, 1758, specific name of type species), *nilotica* (*Bdella*, Savigny, 1822, now specific name of type of species of *Limnatis* Moquin-Tandon, 1827) (Hirudinea); *americana* (*Uncinaria*, Stiles, 1902, now specific name of type species of *Necator* Stiles, 1903), *davainei* (correction of *davainii*, *Tylenchus*, Bastian, 1865, specific name of type species), *dentatus* (*Stephanurus*, Diesing, 1839, specific name of type species), *dentatus* (*Strongylus*, Rudolphi, 1803, now specific name of type species of *Oesophagostomum* Molin, 1861), *duodenale* (*Agchylostoma* [sic], Dubini, 1843, specific name of type of species of *Ancylostoma* Dubini, 1843), *equinus* (*Strongylus*, Müller (O.F.), 1780, specific name of type species), *lumbricoides* (*Ascaris*, Linnaeus, 1758, specific name of type species), *martis* (*Filaria*, Gmelin (J.F.), [1791], specific name of type species of *Filaria* Müller (O.F.), 1787), *medinensis* (*Gordius*, Linnaeus, 1758, now specific name of type species of *Dracunculus* Reichard, 1759), *retortaeformis* (*Strongylus*, Zeder, 1800, now specific name of type species of *Trichostrongylus* Looss, 1905), *schachtii* (*Heterodera*, Schmidt, 1871, specific name of type species), *spingerum* (*Gnathostoma*, Owen, [1837], specific name of type species), *stercoralis* (*Rhabditis*, Bavay, 1876), *trachea* (*Fasciola*, Montagu, 1811, now specific name of type species of *Syngamus* Siebold, 1836), *tritici* (*Vibrio*, Steinbuch, 1799, now specific name of type species of *Anguina* Scopoli, 1777), *volvulus* (emend. under the Plenary Powers of *volvulus*, *Filaria*, Leuckart, [1892]), (Nematoda); *aquaticus* (*Gordius*, Linnaeus, 1758, specific name of type species), *varius* (*Gordius*, Leidy, 1851, now specific name of type species of *Paragordius* Camerano, 1897) (Nematomorpha); *aegyptiacum* (*Diplostomum*, Cobbold, 1876), *appendiculata* (*Fasciola*, Rudolphi, 1802, now specific name of type species of *Hemiurus* Rudolphi, 1809), *dendriticum* (*Distoma*, Rudolphi, 1819), *haematobium* (*Distoma*, Bilharz, [1852], now specific name of type species of *Schistosoma* Weinland, 1858), *hepatica* (*Fasciola*, Linnaeus, 1758, specific name of type species), *heterophyes* (*Distomum*, Siebold, [1852], now specific name of type species of *Heterophyes* Cobbold, 1866), *ovata* (*Fasciola*, Rudolphi, 1803, as defined by the lectotype selected by Braun, 1901) (Trematoda). S.W.

- 332—INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE, 1958.—
“Official index of rejected and invalid specific names in zoology. First instalment: Names 1-527.” London: International Trust for Zoological Nomenclature, xii+73 pp.
- 333—INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE, 1958.—
“Official list of works approved as available for zoological nomenclature. First instalment: Names 1-38.” London: International Trust for Zoological Nomenclature, x+12 pp.
- 334—INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE, 1958.—
“Official index of rejected and invalid works in zoological nomenclature. First instalment: Names 1-58.” London: International Trust for Zoological Nomenclature, x+14 pp.
- 335—LAPAGE, G., 1958.—“Parasitic animals.” Cambridge: W. Heffer & Sons, Ltd., 2nd edit., xxiii+355 pp.
- 336—MARKELL, E. K. & VOGEL, M., 1958.—“Diagnostic medical parasitology.” Philadelphia: W. B. Saunders Co., x+276 pp.

This excellent handbook is, in effect, a concise presentation of human parasitology seen against the general background of infectious agents of disease. Its outstanding merit is its richness in clear, helpful illustrations. Particularly helpful are the chapters on examination of stool specimens; procedures in examination for blood parasites; pseudo-parasites and pitfalls; special diagnostic methods; and fixatives, stains and common procedures. The reader is never burdened with irrelevant detail, nor faced with the choice between alternative methods, the relative merits of which may be difficult to assess. Intestinal helminths (including liver and lung flukes, *Schistosoma mansoni* and *S. japonicum*) have a chapter to themselves, being defined as those forms of which the eggs reach the exterior in the faeces. There is a simple and practical key for the identification of their ova. *Onchocerca volvulus* shares the chapter on tissue parasites with larval tapeworms, *Trichinella spiralis* and *Dracunculus medinensis*. The other filarial worms are relegated to the chapter on blood parasites. *S. haematobium* and *Diocotophyme renale* are found in the chapter on parasites of the genito-urinary system. The book also deals with parasitic protozoa and arthropods. Students of tropical medicine will find this a most helpful book.

J.M.W.

- 337—PETROCHENKO, V. I., 1958.—[Acanthocephala of domestic and wild animals. Volume II.] Moscow: Izdatelstvo Akademii Nauk SSSR., 458 pp. [In Russian.]

Petrochenko devotes this second volume of his monograph to Acanthocephala parasitic in birds and mammals, but includes also four species from amphibians. The following are the chief systematic changes made in this revision. From the subclass Echinorhynchinea, family Polymorphidae [families Arhythmacanthidae, Rhadinorhynchidae and Telosentidae have already been revised in Volume I; for abstract see Helm. Abs., **25**, No. 929], Petrochenko excludes the subfamily Centrorhynchinae and the genera *Filicollis*, *Prosthorhynchus*, *Porrorchis* and *Pseudoporrorchis*, transferring them to the order Gigantorhynchida (see below). The family is divided into three subfamilies: (i) Polymorphinae, (ii) Plagiorhynchinae and (iii) Corynosominae n.subf. (1956) erected for *Corynosoma* and *Bolbosoma*. In the Polymorphinae, *Skrjabiorhynchus* n.g. (1956) is erected for two species from *Polymorphus*, *S. capellae* n.comb. (type) and *S. eroliae* n.comb.; *Arhythmorhynchus sachalinensis* n.sp. is described by Petrochenko, jointly with Krotov, from *Calidris tenuirostris*; and *Hexaglandula*, which was erected by the author in 1950 as a subgenus of *Polymorphus*, is now raised to generic rank and contains *H. mutabilis* and the new combinations *H. corynosoma*, *H. inermis* and *H. pauciamatus* (all transferred from *Polymorphus*). The second subclass revised in this volume, the Gigantorhynchinea n.subclass. (1956) which includes the Metacanthocephala Van Cleave, 1948 *pro parte*, is subdivided into Gigantorhynchida and Oligacanthorhynchida n.ordo (1956). The Gigantorhynchida contains five families: (i) Gigantorhynchidae which is emended to include Centrorhynchinae and in which *Empodius*, earlier made a synonym of *Mediorhynchus* by

Van Cleave, is restored to the rank of an independent genus, while *Leiperacanthus gallinarum* is transferred from the synonymy of *Mediorhynchus* to that of *Empodius* and *M. armenicus* n.sp. is described from *Falco tinnunculus* and *Sturnus caucasicus*; (ii) Apororhynchidae; (iii) Pseudoacanthocephalidae n.fam. (1956) erected for *Pseudoacanthocephalus* n.g. (1956) with the new combinations *P. bufonis*, *P. bufonicola*, *P. caucasicus* and *P. elongatus* (all transferred from *Acanthocephalus*); (iv) Filicollidae n.fam. (1956) which contains *Filicollis* and *Parafilicollis* n.g. (1956) erected for the new combinations *P. altmani* (type), *P. kenti*, *P. major* and *P. sphaerocephalus*; and (v) Prosthorhynchidae n.fam. (1956) erected for *Prosthorhynchus*, *Porrorchis* and *Pseudoporrorchis* in which *Echinorhynchus bazae* is included. To *Prosthorhynchus* are added *P. gracilis* n.sp. from *Vanellus vanellus*, *Sturnus vulgaris*, *S. caucasicus*, *Coracias garullus* and *Tringa ochropus*, and *P. paulus* n.comb. transferred from *Plagiorhynchus*. The Oligacanthorhynchida are subdivided into the Moniliformidae, Oligacanthorhynchidae and Pachysentidae. The three forms of *Moniliformis moniliformis* described by Meyer in 1933 are now made subspecies *M. m. moniliformis* nom.nov., *M. m. siciliensis* nom.nov. and *M. m. aegypticus* nom.nov. Petrochenko describes in detail the disease caused by *Polymorphus* and *Filicollis* in ducks and by *Macracanthorhynchus* in pigs, discusses the zoogeography of Acanthocephala in birds and mammals in the U.S.S.R. and lists the hosts and the genera and species of Acanthocephala.

G.I.P.

- 338—POPOVA, T. I., 1958.—[Principles of nematology, edited by K. I. Skryabin. Vol. VII. Strongyloidea of animals and man. Trichonematidae.] Moscow: Izdatelstvo Akademii Nauk SSSR., 424 pp. [In Russian.]

This seventh volume is a revision of the Trichonematidae. The revision includes descriptions of and keys to all the sub-families, genera and species in this family and also lists of the genera and species and of helminths under hosts. In this volume, Popova transfers *Amira buta* Vuylsteke, 1953 to *Khalilia* calling it a *nomen novum*. *Trichonema caragandicum*, which was transferred to *Schulzitrichonema* by Popova in Volume 3 (1952) of the "Descriptive Catalogue of Parasitic Nematodes" edited by Skryabin, is now left in its original genus.

G.I.P.

- 339—SKRYABIN, K. I., 1958.—[Trematodes of animals and man. Principles of trematodology. Volume XIV.] Moscow: Izdatelstvo Akademii Nauk SSSR., 934 pp. [In Russian.]

In this fourteenth volume of the monograph the characters of the following systematic groups are described: (i) the families Troglotrematidae, Achillurbainiidae, Nanophyetidae and Pholeteridae, which are analysed by Skryabin and remain basically unchanged; (ii) the Plagiorchioidea which is revised by Skryabin & Antipin; they include in Plagiorchidae the subfamilies Plagiorchinae, Styphlodorinae, Styphlotrematinae, Liophistrematinae [Liophistrematinae], Leptophyllinae, Opisthogoniminae, Enodiotrematinae, Encyclometrinae, Pneumonoecesinae and Prosthogoniminae, and accept Ochetosomatidae, Telorchidae, Brachycoeliidae and Maseniidae as the other families of this superfamily. This volume deals only with the Liophistrematinae and the Plagiorchinae. The latter contains the following new species, *Plagiorchis (Plagiorchis) motacillae* n.sp. for *P. maculosus motacillae*, Makarenko's *Plagiorchis (P.)* n.sp. [unnamed] from *Sylvia borin*, Dotsenko's *P. (P.) brevipharynx* n.sp. from *Gallus gallus*, Shaldibin's *P. (P.) mordovii* n.sp. from *Myotis dasycneme* and *P. (P.) symmetrica* n.sp. from *Vespertilio murinus*, Sadovskaya's *P. (Multiglandularis) nedbailovi* n.sp. from *Crocidura lasiura*, Mamaev's *P. (M.) ovoidalis* n.sp. from *Capella gallinago*, and Belous' *Glypthelmins diana* n.sp. from *Rana temporaria* and *Macroderoides asiaticus* n.sp. from *Pseudobagrus fulvidraco*. (iii) In an addendum to the Ochetosomatidae (which was revised in Vol. XIII) Skryabin & Antipin now add the genera *Bilorchis*, *Dolichopera*, *Dolichoperoides*, *Ptyasiorchis*, *Stomatrema*, *Xenopharynx* and *Bhaleropharynx* n.g. which is erected for *X. piscator* and *X. biliphaga*, forms in which the ovary lies anterior to the testes. The specimens described by Khalil in 1923 from *Naja bungarus* as *X. solus* are made synonymous with *X. piscator*. (iv) Azygiioidea is analysed by Skryabin & Gushanskaya. They agree with La Rue, 1957, who erected Azygiata for this superfamily which they had previously included in the Hemiurata.

In this volume the Azygiidae, Xenoperidae and Liocercidae are revised (Hirudinellidae has already appeared in Vol. XIII). The Liocercidae are split into three subfamilies, (a) Liocercinae, (b) Intuscirrinae n.subf. which is erected for *Intuscirrus* and (c) Arnolinae nom.nov. of which Arnoldiinae becomes a synonym (the generic name *Arnola* being given preference over *Arnoldia*) and in which *Arnola infirmus* n.comb. is made for *Genarches infirmus*. (v) In an addendum to the Hemiurata, Skryabin & Gushanskaya bring their previous analysis up to date with respect to work published by Yamaguti in 1942, 1952 and 1953, by Johnson & Copsy in 1953 and by Nagaty in 1956. (vi) In an addendum to Monorchidae (for its revision see Vol. XI) Sobolev completes this family by describing *Pseudoproctotrema* and by including information published by Yamaguti in 1951 and 1952, by Gupta in 1953 and by Caballero, Bravo & Grocott in 1955.

G.I.P.

340—SKRYABIN, K. I., 1958.—[Trematodes of animals and man. Principles of trematodology. Volume XV.] Moscow: Izdatelstvo Akademii Nauk SSSR., 820 pp. [In Russian.]

In this volume Skryabin gives the characteristics of Thapariellidae, Trematobrienidae, Transversotrematidae, Prosogonotrematidae, Maseniidae (which remain unchanged), and Deropristidae n.fam. which he raises from subfamily rank and places in the Lepocreadioidea. The new family contains *Deropristis*, *Pristicola* and *Skryabinopsolus* (Skryabin here agrees with Cable, 1955, although in Vol. IX of the monograph he had included this genus in Acanthocolpidae), but not *Paratormopsolus* until a more detailed study of its type species has been made. Skryabin, jointly with Petrov & Koval, erects Allocreadiata n.subordo for Allocreadioidea, Lepocreadioidea and Opecoeloidea, but in this volume revises only the Opecoeloidea with its family Opecoelidae (the second family Opistholebetidae having already been dealt with in Vol. IX). The Opecoelidae are subdivided into the following six subfamilies (the first four are analysed by Skryabin & Petrov and the last two by Skryabin & Koval), (i) Opecoelinae, which has in addition to the 9 genera included by Gupta (1953), *Anomalotrema*, *Dideutosaccus*, *Megacreadium*, *Neopecoelus*, *Pellamyzon*, *Pseudopecoelina* and *Sphincterostoma*; (ii) Genitocotylineae n.subf., erected for *Genitocotyle*; (iii) Horatrematinae; (iv) Notoporidae, in which *Notoporus carangis* is transferred to *Neonotoporus*; (v) Coitocacinae; and (vi) Plagioporidae, which contains, in addition to the nine genera placed here by Manter (1947), *Eucreadium*, *Neopodocotyle*, *Pachycreadium*, *Hysterogonia*, *Podocotylodes* and *Spinoplagioporus* n.g. (erected for *Plagioporus minutus*). The authors agree with Price (1934) and Miller (1940) that *Lebouria* and *Caudotestis* are synonyms of *Plagioporus* and publish here for the first time the descriptions of Belous' species *P. (Plagioporus) imanensis* n.sp. and *P. (P.) triangulogenitalis* n.sp. both from *Phoxinus lagowskii oxycephalus* [it is stated in the text that these were first mentioned in a dissertation in 1953]. In *P. imanensis* the testes and the ovary lie one behind the other, the right vitellaria extend further forwards than the left, and the eggs are 0.075 mm. long. In *P. triangulogenitalis* the testes lie diagonally, the ovary is level with the anterior testis and the vitellaria are of equal length. In *Podocotyle* the authors give the characteristics of all the species described in the literature and review their synonymy.

G.I.P.

341—YAMAGUTI, S., 1958.—"Systema helminthum. Volume I. The digenetic trematodes of vertebrates." New York: Interscience Publishers, Inc., Part I, pp. xi+979; Part II, pp. 981-1575.

To undertake the compilation of an authoritative account of all the genera of digenetic trematodes of vertebrates is such a herculean task that few helminthologists would have the practical knowledge and experience or the courage to attempt it. In this volume, which is issued in two separate parts, Yamaguti has covered the very extensive literature up to the beginning of 1955. Part I contains an introduction, in which the arrangement is described, and a very brief account of the general morphology of the Digenea and is followed by the main part of the text which is devoted to the classification, arranged under host groups, and from the trematode family downwards through subfamilies, tribes, genera and subgenera. New

generic diagnoses are given and the species in each genus are listed. A number of new synonyms are made. The scheme of classification is likely to prove controversial but as the present incomplete state of our knowledge of the biology, ecology and life-histories precludes the drawing up of any scheme based on characters other than morphological, this is not surprising. The system of dealing with the trematodes under hosts, while of inestimable value to the research worker in the field, does not present a very clear picture of the individual trematode groups: the advantage to the field worker is largely offset by the separation of the figures into Part II, necessitating reference to two books to obtain the description and drawing. This is aggravated by two further disadvantages—firstly by the publishers' evident desire to limit the number of plates which has resulted in such over-reduction in the size of the figures as to make it virtually impossible in many to distinguish the salient generic characters (there is an average of a little over twelve figures per plate), and secondly by the fact that those figures which have been reproduced from other works have had the original labelling blanked out but not the guide lines to the lettering; this latter frequently produces a very confused effect. This, in a work by a man of Professor Yamaguti's calibre, whose original drawings are exquisite, and which costs £35, is much to be lamented. In addition the page headings on pages 937, 939, 941 and 943 read "Digenea of Reptiles" instead of "Digenea of Mammals" and this kind of typographical error is inexcusable. Part II contains the "Systematic Survey of the Digenea of Vertebrates and their Host Relationships" which consists of an alphabetical list of the suborders, families, subfamilies, tribes, genera and subgenera with the host group or groups in which they occur, the bibliography which runs to 216 pages, the 106 plates and the index to the whole volume which runs to 131 pages.

The following new taxonomic units are proposed but new combinations, except in a few instances are omitted from this list: (i) **in fish**—in Bucephalidae, Dolichoenterinae n.subf., Neidhartiinae n.subf., Neoprosorhynchinae n.subf.; in Fellodistomidae, Antorchiinae n.subf., Lissolomatinae n.subf., Monascinae n.subf., Pentagramminae n.subf., Piriforminae n.subf., Symmetrovessiculinae n.subf., Tergestiinae n.subf., *Mesolecitha* (in Heterorchiinae) is emended; in Lecithodendriidae, Ganeoninae n.subf.; in Callodistomidae, Cylindrorchiinae n.subf., Parantorchiinae n.subf., Teratotrematinae n.subf.; in Zoogonidae, Steganodermatinae nom.emend. for Steganoderminae Yamaguti, 1934; in Monorchidae, Monorchinae nom.emend. for Monorchinae Odhner, 1911, Ancyclocoeliinae n.subf., Hurleytrematinae n.subf., Lasiotocinae n.subf., Octotestiinae n.subf., Postmonorchoidinae n.subf., Pseudoproctotrematinae n.subf., Telolecithinae n.subf.; Brahmamputrotrematidae n.fam. for *Brahmamputrotrema punctata* Dayal & Gupta, 1954; in Opisthorchiidae, Aphallinae n.subf., Allogomtiotrematinae nom.nov. for Gomtiotrematinae Gupta, 1955, with *Allogomtiotrema* nom.nov. for *Gomtiotrema* Gupta, 1955; in Gorgoderidae, Phyllodistominae n.subf., Probolotrematinae n.subf., Xystretinae n.subf.; in Haploporidae, Dicrogasterinae n.subf.; in Allocreadiidae, *Pseudoholorchis* n.g. (in Allocreadiinae) for *Holorchis pulcher* Manter, 1954, Crepidostominae nom.emend. for Crepidostomatinae Dollfus, 1951, Enenterinae n.subf., Folliorchiinae n.subf. (for *Folliorchis lateroporus* Srivastava, 1948 from an unnamed fish host in India), Labriferinae n.subf., Lepidapedinae n.subf., Megalagoniinae n.subf., *Manteriella* n.g. (in Opecoelinae) for *Horatrema crassum* Manter, 1947, *Lucknodes* Gupta, 1955 is made a synonym of *Neopecoelina* Gupta, 1955, Opisthogonoporinae n.subf., Orientocreadiinae n.subf. (in which *Ganadotrema* Dayal, 1949 becomes a synonym of *Orientocreadium* Tubangui, 1931), Postporinae n.subf., Sphincterostomatinae n.subf., Spiritestiinae n.subf., Trigonotrematinae n.subf., Urorchiinae n.subf., Walliniinae n.subf. (in which *Parasitotrema* Miller, 1940 is placed provisionally); Dermadenidae n.fam. for *Dermadena lactophrysi* Manter, 1946; Aphanhysteridae n.fam. for *Aphanhystera monacensis* Guiart, 1938; Apocreadiidae n.fam. with Myzotinae n.subf.; in Azygiidae, Proterometrinae n.subf.; in Echinostomatidae, Singhiinae n.subf. with *Singhia* n.g. for *Echinostoma thapari* Singh, 1943; in Acanthocolpidae, Pristicolinae n.subf., Stephanostominae n.subf.; in Cryptogonimidae, *Pseudocryptogonimus* n.g. (in Cryptogoniminae) for *Cryptogonimus cirrhiti* Bravo, 1953, Baccigerinae n.subf., Biovariinae n.subf., Caecincolinae n.subf., Metadeninae n.subf., Polyorchitrematinae n.subf., Pseudexorchiinae n.subf., Pseudometadeninae n.subf., Tubanguinae n.subf.; in Acanthostomidae, *Gymnatrema* Morosov in

Skryabin, 1955 is made a subgenus of *Acanthostomum* and is removed from the Brientrematinae, Anisocladiinae n.subf., Anoiktostomatinae nom.emend. for Anoiktostominae Nicoll, 1914, Pseudoacanthostominae n.subf., Telogasterinae n.subf.; in Microphallidae, Pseudosellactoylinae n.subf.; in Plagiorchiidae, Protenterinae n.subf.; in Waretrematidae (emended), Waretrematinae n.subf.; in Monodhelminthidae, Monodhelminthinae nom.emend. for Monodhelminae Srivastava, 1939; in Hemiuridae, Arnolinae n.subf., *Theletrum* Linton, 1910 is emended and placed tentatively in Bunocotylinae, *Leurodera* Linton, 1910 (in Dero-genetinae) is emended, *Dictysarca* Linton, 1910 (in Dictysarcinae) is emended, Dissosaccinae n.subf., Glomerircirrinae n.subf., Hemiperinae n.subf. (in which *Hemiperina* Manter, 1934 is made a synonym of *Hemipera* Nicoll, 1912), Hypohepticolinae n.subf., Hysterolecithinae n.subf., *Separogermiductus* Skryabin & Gushanskaya, 1955 (in Sterrhurinae) is made a synonym of *Sterrhurus* Looss, 1907, Stomachicolinae n.subf. with *Allostomachicola* n.g. for *Stomachicola secundus* Srivastava, 1939, Trifoliovariinae n.subf.; in Syncoeliidae, Paronatremaninae n.subf.; in Accacoeliidae, Accacladiinae n.subf., Orophocotylinae n.subf., Rhynchopharynginae n.subf.; in Didymozoidae, Didymozoinae nom.emend. for Didymozooinae Ishii, 1935, Atalostrophinae n.subf., Colocyntotrematinae n.subf., Glomeritrematinae n.subf., Neodiplo-trematinae n.subf., Opepherotrematinae n.subf.; in Angiodictyidae, Denticaudinae n.subf. with *Pseudoparabaris* n.g. for *Parabaris* Travassos, 1923 (preoccupied), Hexangiinae n.subf.; in Gyliauchenidae, Gyliaucheninae n.subf., Apharyngogyliaucheninae n.subf.; in Paramphistomidae, Dadayiinae nom.emend. for Dadayinae Fukui, 1929, Dadaytrematinae n.subf., Macrorchitrematinae n.subf., Microrchiinae n.subf.; in Sanguinicolidae, Sanguinicolinae n.subf., Cardicolinae n.subf., Deontacyclinae n.subf., Psetteriinae n.subf.; (ii) **in amphibians**—in Paramphistomidae, *Pseudopisthodiscus* n.g. (in Diplodiscinae) for *Opisthodiscus americanus* Holl, 1928, Pseudochiorchiinae n.subf. with *Pseudochiorchis* n.g. for *Chiorchis buria Prudhoe*, 1944; in Lecithodendriidae, Cryptotropinae n.subf., Prosotocinae n.subf.; in Plagiorchiidae, Haematoloecinae nom.emend. for Haematoloecinae Freitas & Lent, 1939; (iii) **in reptiles**—in Plagiorchiidae, Alloglyptinae n.subf., Aptorchiinae n.subf., Encyclometrinae nom.emend. for Encyclometriinae Mehra, 1931, *Metaleptophallus* n.g. (in Leptophallinae) for *Leptophallus gracillimus* Lühe, 1909, Macroderinae n.subf., Natrioderinae n.subf., Oistosominae n.subf., Stomatrematinae n.subf., *Glossidioides* n.g. (in Styphlodorinae) for *Glossidium loossi* Travassos, 1927; in Telorchidae, Loeffgreniinae n.subf.; in Lecithodendriidae, Prosthodendriinae n.subf.; in Microcoeliidae, Anchitrematinae nom.emend. for Anchitreminae Mehra, 1935; in Callodistomidae, Braunotrematinae n.subf.; Pachysolididae n.fam.; in Pronocephalidae, Cetiosaccinae n.subf., Desmogoniinae n.subf., Diaschistorchiinae n.subf., Macravestibulinae n.subf., Metacetabulinae n.subf. (Metacetabulidae Freitas & Lent, 1938 relegated to subfamily rank); in Angiodictyidae, Angiodictyinae n.subf., Dictyangiinae n.subf., Octangioidinae n.subf.; in Gorgoderidae, Plesiochorinae n.subf.; in Spirorchidae, Spirorchini n.tribe and Spirhapalini n.tribe (in Spirorchinae), Amphiorchiinae n.subf., Carettacolinae n.subf., Hapalorhynchinae n.subf., Neospirorchinae n.subf., Tremarhynchinae n.subf., Unicaecinae nom.emend. for Unicaecuminae Mehra, 1934, Vasotrematinae n.subf.; in Proterodiplostomidae, Massoprostatinae n.subf.; in Paramphistomidae, Dermatemytrematinae n.subf., *Pseudallassostoma* n.g. (in Schizamphistominae) for *Cladorchis heteroxenus* Cordero & Vogelsang, 1940; (iv) **in birds**—in Schistosomatidae, Dendrobilharziinae nom.emend. for Dendrobilharzinae Mehra, 1940, Gigantobilharziinae nom.emend. for Gigantobilharzinae Mehra, 1940; in Echinostomatidae, *Neacanthoparyphium* n.g. (in Echinostominae) for *Echinoparyphium petrovi* Nevostrueva, 1954 [1953], Balfouriinae n.subf., Ignaviinae n.subf., Pelmatostominae n.subf.; in Psilostomidae, *Pseudopsilostoma* n.g. (in Psilostominae) for *Psilostomum varium* Linton, 1928, *Sharmaia* n.g. (in Psilostominae) for *Mehlisia gatesi* Sharma, 1943, Apopharynginae n.subf., Sphaeridiotrematinae n.subf.; in Pliphthalmidae, Cloacitrematinae n.subf., Echinostephillinae n.subf., Parorchinae nom.emend. for Parorchinae Lal, 1936, Skryabinovermiinae n.subf.; in Brachylaemidae, Leucochloridiomorphinae n.subf., Scaphiostominae n.subf.; in Leucochloridiidae, Urorygminae n.subf., Urotocinae n.subf.; in Clinostomidae, Euclinostominae n.subf., Ithyoclinostominae n.subf.; in Opisthorchiidae, Diasiellinae n.subf., Tubangorchinae n.subf.;

in Heterophyidae, Ascocotylinae n.subf., Scaphanocephalinae n.subf., Novemtestiinae n.subf., Opisthometrinae n.subf., Pygidiopsinae n.subf., Stictodorinae n.subf. with *Parastictodora* relegated to subgeneric rank of *Stictodora*, Tetracadiinae n.subf.; in Microphallidae, Parvatrematinae n.subf.; in Stomylotrematidae, Stomylotrematinae nom.emend. for Stomylotrematinae Travassos, 1922, Laterotrematinae n.subf.; in Lecithodendriidae, Basantisiinae n.subf., Echinuscodendriinae n.subf., *Pseudocryptotropa* n.g. (in Phaneropsolinae) for *Cryptotropa macrotestis* Belopolskaya, 1954; in Dicrocoeliidae, nine new tribes are proposed of which a definition or key to genera is here given for Platynotrematini, Proacetabulorchiini, Lutz-trematini, Lyperosomini and Brachydistomini, the remaining four being dealt with in greater detail under mammals, Stromitrematinae n.subf., *Olssoniella olssoni* of Travassos, 1944 is transferred to *Brachydistomum* and all other species of *Olssoniella* to *Brachylecithum*; in Troglotrematidae, Rencoliniae n.subf.; Cortrematidae n.fam. for *Cortrema corti* Tang, 1951; in Cyclocoelidae, *Szidatiella* n.g. (in Cyclocoelinae) for *Cyclocoelum vogeli* Szidat, 1932; in Eucotylidae, Eucotylinae n.subf., Tanaisiinae n.subf. (in which Yamaguti adds three subgenera to *Tanaisia*, disagreeing with Freitas who made *Tamerlania*, *Ohridia* and *Lepidopteria* synonyms of *Tanaisia*); (v) **in mammals**—Anenterotrematidae n.fam.; in Plagiorchiidae, *Neoglyphe* Shaldibin, 1954 emended (in Omphalometrinae); in Lecithodendriidae, Castroiinae n.subf., Cephalophallinae n.subf., Limatulinae n.subf. (with *Retortosacculus* n.g. for *Distomum trigonostomum* Mödinger, 1930), Maxbrauniinae n.subf., Parabascinae n.subf. (with *Moedlingeria* n.g. for *Distomum amphoraeformis* Mödinger, 1930), Pycnoporinae n.subf., Vesperugidendriinae n.subf.; in Dicrocoeliidae (Dicrocoeliinae) seven new tribes are proposed of which Dicrocoeliini, Athesmiini, Brachylecithini and Eurytrematini are also mentioned under birds and Brodeniini, Controrchiini and Euparadistomini are here mentioned for the first time, Leipertrematinae n.subf.; in Campulidae, Lecithodesminae n.subf., Odhneriellinae n.subf. (in which *Leucasiella* Krotov & Delyamure, 1952 is made a synonym of *Hadwenius* Price, 1932), Orthosplanchninae n.subf., Synthesiinae n.subf.; in Opisthorchiidae, Pholeterinae n.subf., Pseudamphistominae n.subf., Stephanolecithinae n.subf.; in Heterophyidae, Euryhelminthinae nom.emend. for Euryhelminae Morozov, 1950; in Nanophyetidae, Macroorchinae n.subf., Sellacotylinae n.subf.; in Echinostomatidae, *Allopetasiger* n.g. (in Echinostomatinae) for *Petasiger linguiformis* Kogame, 1935; Rhopaliasidae nom.emend. for Rhopaliidae Looss, 1899; in Psilostomidae (Psilostominae), *Pseudopsilostoma ondatrae* n.comb. for *Psilostomum ondatrae* Price, 1931, and *P. ondatrae* of Beaver, 1939 becomes *Ribeiroia thomasi*, *Psilotrematoides* n.g. (in Psilostominae) for *Psilotrema castoris* Orlov, 1956; in Brachylaemidae, Itygoniminae n.subf., Panopistinae n.subf.; Moreauiidae n.fam. for *Moreauia mirabilis* Johnston, 1915; in Opisthotrematidae, Lankatrematinae n.subf.; in Rhabdiopoeidae, Rhabdiopoeinae n.subf., Taprobanellinae n.subf.; in Paramphistomidae, Paramphistomini n.tribe and Ceylonocotylini n.tribe (both in Paramphistominae), *Gigantatrium* n.g. (in Ceylonocotylini) for *Nilocotyle gigantatrium* Näsmark, 1937, *Glyptamphistoma* n.g. (in Ceylonocotylini) for *N. paradoxum* Näsmark, 1937, *Paramphistomoides* n.g. (in Ceylonocotylini) for *Paramphistomum maplestonei* Bhalerao, 1937, *Platyamphistoma* n.g. (in Ceylonocotylini) for *N. polycladiforme* Näsmark, 1937, *Pseudoparamphistoma* n.g. (in Ceylonocotylini) for *Paramphistomum cuonum* Bhalerao, 1937, Olveriini n.tribe and Cladorchiini n.tribe, both in Cladorchiinae; Johnsonitrematinae n.subf. for *Johnsonitrema* n.g. for *Paramphistomum magnum* Johnson, 1939.

S.W.

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